

Counting first-order models (with n individuals) of syllogisms

1 Introduction

This note describes some experimentation I've been doing on how many finite models of a particular size there are of syllogistic premises, and how many of these are countermodels of possible conclusions. I hope that someone will be able to tell me how this relates to other work. (I've been playing with this during idle moments as my day job is a PhD in the psychology of reasoning.)

Readers who are used to playing around with linear logic, etc, may wonder why syllogisms are of interest. One reason is that people tend not to be very good at syllogisms, when judged against classical logic, but they're not just guessing randomly: this sort of thing gets psychologists excited. Lots of factors have been shown to influence the inferences drawn, e.g., term-orders of the premises (Störring, 1908; Johnson-Laird & Steedman, 1978), individual differences in scribble strategy (Ford, 1995; Bacon, Handley, & Newstead, 2003), individual differences in visual and verbal ability (Ando et al., 2006), whether one has dyslexia (Bacon, Handley, & McDonald, 2007), how terms like *some* and *all* are interpreted in simpler reasoning problems (e.g., Stenning & Cox, 2006), one's position on the autism spectrum continuum (my work, coming soon). A lot of the interest is in how people who do not have a training in classical logic, and who differ in various ways, tackle the problems, and bring to bear their knowledge and abilities from outside the psych lab. The work is not all about classical logic ability: there are models of what non-logicians are doing (and trying to do) when they reason about the problems.

The structure of this note is as follows: first I'll introduce syllogisms, how 'mental models' from the early 80's (still under revision and going strong) have been used to model people's performance on them. I'll show the simple method I used to enumerate models and then how I conjectured closed forms to generate the counts. There are three large appendices with lists of counts and conjectured formulae that generate them. I hope someone will look at the formulae and think, 'Ah ha! I recognise those from somewhere!'

1.1 Syllogisms

Syllogisms are arguments containing two premises and one conclusion, each of which has a single quantifier, subject, and predicate. For instance:

All intellectuals are dreamers
Some logicians are not dreamers, therefore
Some logicians are not intellectuals

Here 'intellectuals' and 'logicians' are the subjects, and 'dreamer' is the predicate in both premises. Various tasks are used in the psychology literature, for instance you show people a load of premise pairs and ask them what follows. A total of 64 premise-pairs are generated by varying the quantifiers present (*all*, *no*, *some*, *some...not*) and the order of the terms in both premises, given by the following schema:

$$\begin{array}{cccc} Q_1A \text{ are } B & Q_1A \text{ are } B & Q_1B \text{ are } A & Q_1B \text{ are } A \\ Q_2B \text{ are } C & Q_2C \text{ are } B & Q_2B \text{ are } C & Q_2C \text{ are } B \end{array}$$

The term B in this schema is called the middle-term; A and C are the end-terms. The arrangement of terms is called the *figure*. These are often numbered, but I resist as the numbers have changed over time (see, e.g., Bobzien, 2000) and psychologists continue to adhere to different conventions. For ease of comprehension we name them by the term orders, first premise first: $ABBC$, $ABCB$, $BABC$, and $BACB$, so the example above has the figure $ABCB$.

1.2 Mental models

Syllogistic reasoning has been described by a wide variety of psychological models, e.g., 'mental rules' (Rips, 1994), probabilistic heuristic model (Chater & Oaksford, 1999; Oaksford & Chater, 2007), source-founding model (Stenning & Yule, 1997; Stenning & Cox, 2006). The most well known attempt to model syllogistic reasoning performance using first-order model construction is by Johnson-Laird and colleagues. The general idea is that

*Notes in this series are for ϵ -baked ideas, for $1 \geq \epsilon \geq 0$. Only exceptionally should they be cited or distributed outwith the Mathematical Reasoning Group.

first-order model selection, given suitable heuristics, can give a proof procedure which, in terms of inferences drawn, is equivalent to more explicitly inference based approaches. Inferences made during performance can also be modelled; differences to classical logic are explained as being due to an unsound model selection algorithm or due to working memory limitations. The theory has undergone two main revisions, e.g., for the first see Johnson-Laird (1983, Ch. 5). I shall describe a more recent version (see Johnson-Laird & Byrne, 1991, pp. 118–124).

First a model is constructed for the initial premise of the problem:

All <i>A</i> are <i>B</i>	\rightsquigarrow	$\begin{array}{l} [A] \ B \\ [A] \ B \\ \dots \end{array}$	No <i>A</i> are <i>B</i>	\rightsquigarrow	$\begin{array}{l} [A] \\ [A] \\ \dots \end{array}$		$\begin{array}{l} [B] \\ [B] \\ \dots \end{array}$
Some <i>A</i> are <i>B</i>	\rightsquigarrow	$\begin{array}{l} A \ B \\ A \ B \\ \dots \end{array}$	Some <i>A</i> are not <i>B</i>	\rightsquigarrow	$\begin{array}{l} A \\ A \\ A \ [B] \\ A \ [B] \\ \dots \end{array}$		$\begin{array}{l} [B] \\ [B] \\ \dots \end{array}$

Each row represents an individual. The presence of square brackets around a property name indicates that the property has been fully represented. For instance, the initial model of All *A* are *B* has exactly 2 individuals with the property *A* and at least 2 with the property *B*. They write, ‘The number of individuals remains arbitrary, but, for simplicity, is likely to be small’ (Johnson-Laird & Byrne, 1991, p. 119), which I take to mean that the 2 could be any small constant.

The second stage of construction is to add information from the second premise. For instance from All *A* are *B* and All *B* are *C* ‘the following sort of initial model’ is constructed (Johnson-Laird & Byrne, 1991, p. 121):

[[<i>A</i> <i>B</i>]	<i>C</i>
[[<i>A</i> <i>B</i>]	<i>C</i>
...	

This use of the bracket notation asserts that *A* is exhausted with respect to *B* and *B* is exhausted with respect to *C*. To put it another way, there are exactly 2 *A*’s, and both of them have the property *B*. Also there are exactly 2 *B*’s, and both of them have the property *C*. From this one model, the conclusion that All *A* are *C* is easily drawn, which it happens is true in all first-order models. In the computer simulation¹ of this version of the theory, All *C* are *A* is also true in this model. This conclusion is invalid since it doesn’t hold in all models, so according to the implementation to correctly withhold this conclusion requires examining more than one model.

Consider the example All *B* are *A* and No *B* are *C*. The initial model constructed is (Johnson-Laird & Byrne, 1991, p. 122):

[<i>A</i> [<i>B</i>]]	
[<i>A</i> [<i>B</i>]]	
...	[<i>C</i>]
	[<i>C</i>]

In this model, No *C* are *A* is true. However this conclusion is not true in all models, for instance

[<i>A</i> [<i>B</i>]]	
[<i>A</i> [<i>B</i>]]	
<i>A</i>	[<i>C</i>]
	[<i>C</i>]
...	

So again this would be considered a multiple model problem. Many models could be chosen—in the worst case, infinitely many. Hence the under specification of the theory ensures that any data can characterised, given appropriate selection and manipulation of the models chosen. For instance, problems currently designated as being multiple model could occasionally be single model given a fortuitous choice.

¹Thanks to Phil Johnson-Laird for providing this.

$$\begin{aligned}
\llbracket \top \rrbracket_{\mathcal{M}} &= \text{true} \\
\llbracket \perp \rrbracket_{\mathcal{M}} &= \text{false} \\
\llbracket P(t_1, \dots, t_n) \rrbracket_{\mathcal{M}} &= P^{\mathcal{M}}(t_1^{\mathcal{M}}, \dots, t_n^{\mathcal{M}}) \\
\llbracket \phi \wedge \psi \rrbracket_{\mathcal{M}} &= \text{true iff } \llbracket \phi \rrbracket_{\mathcal{M}} \text{ and } \llbracket \psi \rrbracket_{\mathcal{M}} \text{ both give true} \\
\llbracket \phi \vee \psi \rrbracket_{\mathcal{M}} &= \text{true iff at least one of } \llbracket \phi \rrbracket_{\mathcal{M}} \text{ and } \llbracket \psi \rrbracket_{\mathcal{M}} \text{ gives true} \\
\llbracket \phi \Rightarrow \psi \rrbracket_{\mathcal{M}} &= \text{false iff } \llbracket \phi \rrbracket_{\mathcal{M}} = \text{true and } \llbracket \psi \rrbracket_{\mathcal{M}} = \text{false} \\
\llbracket \neg \phi \rrbracket_{\mathcal{M}} &= \text{true iff } \llbracket \phi \rrbracket_{\mathcal{M}} = \text{false, otherwise true} \\
\llbracket \forall x. P(x) \rrbracket_{\mathcal{M}} &= \text{true iff false } \notin \{P^{\mathcal{M}}(y) \mid y \in \text{dom}(\mathcal{M})\} \\
\llbracket \exists x. P(x) \rrbracket_{\mathcal{M}} &= \text{true iff true } \in \{P^{\mathcal{M}}(y) \mid y \in \text{dom}(\mathcal{M})\}
\end{aligned}$$

Figure 1: Classical interpretation for first-order logic

$A(i_1)$	$B(i_1)$	$C(i_1)$	$A(i_2)$	$B(i_2)$	$C(i_2)$...	$A(i_n)$	$B(i_n)$	$C(i_n)$
0	0	0	0	0	0	...	0	0	0
0	0	0	0	0	0	...	0	0	1
0	0	0	0	0	0	...	0	1	0
0	0	0	0	0	0	...	0	1	1
0	0	0	0	0	0	...	1	0	0
\vdots	\vdots	\vdots	\vdots	\vdots	\vdots	...	\vdots	\vdots	\vdots
1	1	1	1	1	1	...	1	1	1

Figure 2: Truth table to represent syllogistic models

1.3 Back to first-order models

Typically, the following mapping is used from the syllogistic language into the language of classical logic:

$$\begin{aligned}
\text{All } A \text{ are } B &\rightsquigarrow \forall x. A(x) \Rightarrow B(x) \\
\text{No } A \text{ are } B &\rightsquigarrow \forall x. A(x) \Rightarrow \neg B(x) \\
\text{Some } A \text{ are } B &\rightsquigarrow \exists x. A(x) \wedge B(x) \\
\text{Some } A \text{ are not } B &\rightsquigarrow \exists x. A(x) \wedge \neg B(x)
\end{aligned}$$

Then the usual Tarskian magic applies. An interpretation of a sentence ϕ in a model \mathcal{M} , written $\llbracket \phi \rrbracket_{\mathcal{M}}$, is a function from sentences and models to truth values.² See Figure 1 for a definition. Essentially it says things like ‘ $A \wedge B$ is true when A is true and B is true’ and ‘ $\forall x. P(x)$ is true when $P(x)$ is true for every x ’, so it shows how to lift the formal expression out to the mathematical vernacular.³

2 Enumerating and counting the models

To enumerate the models, we view them as rows in a truth table with $3n$ propositional variables, where n is the number of individuals (see Figure 2). A row in the table specifies a particular model by listing for which individuals, i_j , each predicate is true. For the first row, all the predicates are false for all individuals. For the last row, all are true for all individuals. From this arrangement it can be seen that there are 2^{3n} models with n individuals since a truth table with n columns has 2^n rows.

Counting models consists then of restricting the table to appropriate subsets of models. For instance to find all models of *all A are B* and *all B are C* we restrict to rows where if $A(i_j)$ is true, then $B(i_j)$ is true, and where if $B(i_j)$ is true, then $C(i_j)$ is true. Table 1 shows how in how many models these premises are true, for models with up to five individuals.

²The formalisation of this idea is usually attributed to Tarski and Vaught (1956).

³Other variants make the definition in terms of arithmetic by representing true as 1 and false as 0, so for instance $P \wedge Q = \min(P, Q)$, $P \vee Q = \max(P, Q)$, and so on. In this case, arithmetic in a sense becomes the metalanguage.

individuals	1	2	3	4	5
models	4	16	64	256	1024

Table 1: Model counts for the premises *all A are B*, *all B are C*

We can also look at counter models of the conclusion in models of some set of premises. Take the conjecture *some A are not B*, *all B are C* \models *all C are A*. Table 2 shows the counts. As you can see, for models with two individuals, countermodels of the conclusion are in the minority (40%), whereas for models with five individuals the majority of models (85%) are countermodels of the conclusion.

individuals	1	2	3	4	5
models of premises	2	20	152	1040	6752
countermodels of conclusion	0	8	96	800	5760

Table 2: Model counts for the conjecture *some A are not B*, *all B are C* \models *all C are A*

Appendix A shows the counts of models and countermodels for all syllogistic conjectures, with up to five individuals.

Does this have anything to do with the psychology? Well a brief look via linear regression in a dataset I collected indicated that the proportion of counter models to a conclusion drawn by a participant explains a tiny amount of the variance in reaction times ($R^2 = .05$), when supposing that all the observations within a participant are independent. The model was just:

$$RT_c = CM_{2,c}/M_{2,c} + CM_{3,c}/M_{3,c} + CM_{4,c}/M_{4,c} + \epsilon_c$$

where c is a conjecture, $Q(A, B), Q(B, C) \vdash Q(A, C)$; $M_{i,c}$ is the number of models (of size i) of $Q(A, B)$ and $Q(B, C)$; and $CM_{i,c}$ is the size of the subset of that in which $Q(A, C)$ does not hold. Since this effect size was dwarfed by other factors, I haven't (yet) done much more with it.

3 Conjectures about model size

The work described previously was done over a year ago. This week I decided it might be fun to have a look again at the counts and see if I could find closed forms to produce them. Some were easy, e.g., the constant 0 and 2^{2^n} ; some were not, e.g., $6^n + 4^n - 2 \cdot 5^n$. I suspect the 'proper' way to do this is to think about the mathematical structures being created; certainly binary matrices of dimension $2^{3n} \times 3n$ are probably relevant. I decided just to look at the numbers, using the fantastic *On-Line Encyclopedia of Integer Sequences* to lend a helping hand.

I got two hits on the encyclopedia: A051588 and A016103. A051588 turns out to be the number of $3 \times n$ binary matrices such that any 2 rows have a common 1, and was described originally by Jovovic and Kilibarda (1999): thus it appears that Post classes might be relevant. A016103 was described only as 'Expansion of $1/(1-4x)(1-5x)(1-6x)$ ', and gave no closed form. Not completely helpful. Luckily the other functions I'd found, and the sequences close to A016103, hinted that a function of the form

$$\alpha_1 \cdot \beta_1^n + \alpha_2 \cdot \beta_2^n + \alpha_3 \cdot \beta_3^n + \alpha_4 \cdot \beta_4^n$$

was probably going to do the trick; I just had to find α 's and β 's. So some number crunching later, out popped $4^n + 6^n - 2 \cdot 5^n$. The others turned out to be derivable from functions I had already, so a lovely network of dependencies exists; jumping from sequence to sequence filled in the gaps.

See Appendix B for closed-forms for the number of models of the premises. Appendix C shows the number of countermodels of the conclusions.

4 Conclusions

Much work could be done, e.g., making the formulae more general, finding connections to work which does this already. I have asked around in various places, e.g., the *Foundations of Mathematics* mailing list, to see if these sorts of things had been counted. No joy as yet. A result of relevance must be the following for monadic logic, of which syllogisms are a fragment (see Boolos & Jeffrey, 1980, Ch. 25).⁴

⁴Thanks AlanS for the tip-off.

Theorem 4.1 *If P is a monadic formula which is satisfiable, then P is true in some interpretation whose domain contains at most $2^k \cdot r$ members, k being the number of predicates and r being the number of variables in P .*

From this, it is possible to derive a model-theoretic algorithm for checking if a syllogistic inference is valid, since it suffices to check if its negation is satisfiable—if not, then the syllogism is valid. Syllogistic inference can be written as

$$Q_1x. A(x)B(x) \wedge Q_2x. B(x)C(x) \Rightarrow Q_3x. A(x)C(x)$$

where the Q_i 's are the quantifiers. To check if this is true in all models means to check if

$$\neg[Q_1x. A(x)B(x) \wedge Q_2x. B(x)C(x) \Rightarrow Q_3x. A(x)C(x)]$$

is false in all models with at most $2^3 \cdot 3 = 24$ individuals. That's a lot of models. It turns out that it suffices to restrict attention to countable models with 3 individuals since for such models only the conclusions of valid syllogistic inferences are indeed true.

I suspect this sort of approach might be relevant to schematic proof (Jamnik & Bundy, 2005). For instance it might be interesting to take a subset of conjectures about lists, or some area of number theory, and classify them in terms of how wrong they are. Then you can use the result to investigate how people steer themselves when reasoning about things by example.

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A A table of counts of first-order models and counter models for syllogisms

Table 3: A table of counts of first-order models and counter models for syllogisms. Column CM_i denotes how many models of the premises of size i are countermodels of the conclusion; M_i gives how many models of the premises there are of size i . The rows are sorted by CM_5/M_5 , so all the very classically correct conjectures are first and all the very classically wrong conjectures are last.

Premise 1	Premise 2	Conclusion	Counts									
			CM_1	M_1	CM_2	M_2	CM_3	M_3	CM_4	M_4	CM_5	M_5
All A are B	All B are C	All A are C	0	4	0	16	0	64	0	256	0	1024
All B are A	All C are B	All C are A	0	4	0	16	0	64	0	256	0	1024
All A are B	No B are C	No A are C	0	4	0	16	0	64	0	256	0	1024
All A are B	No B are C	No C are A	0	4	0	16	0	64	0	256	0	1024
All A are B	No C are B	No A are C	0	4	0	16	0	64	0	256	0	1024
All A are B	No C are B	No C are A	0	4	0	16	0	64	0	256	0	1024
No A are B	All C are B	No A are C	0	4	0	16	0	64	0	256	0	1024
No A are B	All C are B	No C are A	0	4	0	16	0	64	0	256	0	1024
No B are A	All C are B	No A are C	0	4	0	16	0	64	0	256	0	1024
No B are A	All C are B	No C are A	0	4	0	16	0	64	0	256	0	1024
All B are A	Some B are C	Some A are C	0	1	0	11	0	91	0	671	0	4651
All B are A	Some B are C	Some C are A	0	1	0	11	0	91	0	671	0	4651
All B are A	Some C are B	Some A are C	0	1	0	11	0	91	0	671	0	4651
All B are A	Some C are B	Some C are A	0	1	0	11	0	91	0	671	0	4651
All A are B	Some C are not B	Some C are not A	0	1	0	11	0	91	0	671	0	4651
All B are A	Some B are not C	Some A are not C	0	1	0	11	0	91	0	671	0	4651
Some A are B	All B are C	Some A are C	0	1	0	11	0	91	0	671	0	4651
Some A are B	All B are C	Some C are A	0	1	0	11	0	91	0	671	0	4651
Some B are A	All B are C	Some A are C	0	1	0	11	0	91	0	671	0	4651
Some B are A	All B are C	Some C are A	0	1	0	11	0	91	0	671	0	4651
Some A are B	No B are C	Some A are not C	0	1	0	11	0	91	0	671	0	4651
Some A are B	No C are B	Some A are not C	0	1	0	11	0	91	0	671	0	4651
Some A are B	No B are C	Some A are not C	0	1	0	11	0	91	0	671	0	4651
Some B are A	No B are C	Some A are not C	0	1	0	11	0	91	0	671	0	4651
Some B are A	No C are B	Some A are not C	0	1	0	11	0	91	0	671	0	4651
No A are B	Some B are C	Some C are not A	0	1	0	11	0	91	0	671	0	4651
No A are B	Some C are B	Some C are not A	0	1	0	11	0	91	0	671	0	4651
No B are A	Some B are C	Some C are not A	0	1	0	11	0	91	0	671	0	4651
No B are A	Some C are B	Some C are not A	0	1	0	11	0	91	0	671	0	4651
Some A are not B	All C are B	Some A are not C	0	1	0	11	0	91	0	671	0	4651
Some B are not A	All B are C	Some C are not A	0	1	0	11	0	91	0	671	0	4651
All A are B	All B are C	Some C are not A	2	4	4	16	8	64	16	256	32	1024
All B are A	All C are B	Some A are not C	2	4	4	16	8	64	16	256	32	1024

(Continued on next page)

Table 3—continued from previous page

Premise 1	Premise 2	Conclusion	Counts									
			CM ₁	M ₁	CM ₂	M ₂	CM ₃	M ₃	CM ₄	M ₄	CM ₅	M ₅
All B are A	All B are C	Some A are C	3	5	9	25	27	125	81	625	243	3125
All B are A	All B are C	Some C are A	3	5	9	25	27	125	81	625	243	3125
All B are A	No B are C	Some A are not C	3	5	9	25	27	125	81	625	243	3125
All B are A	No C are B	Some A are not C	3	5	9	25	27	125	81	625	243	3125
No A are B	All B are C	Some C are not A	3	5	9	25	27	125	81	625	243	3125
No B are A	All B are C	Some C are not A	3	5	9	25	27	125	81	625	243	3125
All A are B	Some B are C	Some C are not A	1	2	7	20	37	152	175	1040	781	6752
All A are B	Some C are B	Some C are not A	1	2	7	20	37	152	175	1040	781	6752
All B are A	Some C are not B	Some A are C	1	2	7	20	37	152	175	1040	781	6752
All B are A	Some C are not B	Some C are A	1	2	7	20	37	152	175	1040	781	6752
Some A are B	All C are B	Some A are not C	1	2	7	20	37	152	175	1040	781	6752
Some B are A	All C are B	Some A are not C	1	2	7	20	37	152	175	1040	781	6752
No A are B	Some C are not B	Some C are not A	1	2	7	20	37	152	175	1040	781	6752
No B are A	Some C are not B	Some C are not A	1	2	7	20	37	152	175	1040	781	6752
Some A are not B	All B are C	Some A are C	1	2	7	20	37	152	175	1040	781	6752
Some A are not B	All B are C	Some C are A	1	2	7	20	37	152	175	1040	781	6752
Some A are not B	No B are C	Some A are not C	1	2	7	20	37	152	175	1040	781	6752
Some A are not B	No C are B	Some A are not C	1	2	7	20	37	152	175	1040	781	6752
Some A are B	Some B are C	Some A are C	0	1	2	17	30	205	302	2129	2550	20341
Some A are B	Some B are C	Some C are A	0	1	2	17	30	205	302	2129	2550	20341
Some A are B	Some C are B	Some A are C	0	1	2	17	30	205	302	2129	2550	20341
Some A are B	Some C are B	Some C are A	0	1	2	17	30	205	302	2129	2550	20341
Some B are A	Some B are C	Some A are C	0	1	2	17	30	205	302	2129	2550	20341
Some B are A	Some B are C	Some C are A	0	1	2	17	30	205	302	2129	2550	20341
Some B are A	Some C are B	Some A are C	0	1	2	17	30	205	302	2129	2550	20341
Some B are A	Some C are B	Some C are A	0	1	2	17	30	205	302	2129	2550	20341
Some A are B	Some B are not C	Some A are not C	0	1	2	17	30	205	302	2129	2550	20341
Some B are A	Some B are not C	Some A are not C	0	1	2	17	30	205	302	2129	2550	20341
Some B are not A	Some B are C	Some C are not A	0	1	2	17	30	205	302	2129	2550	20341
Some B are not A	Some C are B	Some C are not A	0	1	2	17	30	205	302	2129	2550	20341
Some A are not B	Some C are not B	Some A are C	0	1	2	17	30	205	302	2129	2550	20341
Some A are not B	Some C are not B	Some C are A	0	1	2	17	30	205	302	2129	2550	20341
Some A are B	Some C are not B	Some A are C	0	0	2	8	30	144	302	1760	2550	18240
Some A are B	Some C are not B	Some C are A	0	0	2	8	30	144	302	1760	2550	18240
Some B are A	Some C are not B	Some A are C	0	0	2	8	30	144	302	1760	2550	18240
Some B are A	Some C are not B	Some C are A	0	0	2	8	30	144	302	1760	2550	18240
Some A are not B	Some B are C	Some A are C	0	0	2	8	30	144	302	1760	2550	18240
Some A are not B	Some B are C	Some C are A	0	0	2	8	30	144	302	1760	2550	18240
Some A are not B	Some C are B	Some A are C	0	0	2	8	30	144	302	1760	2550	18240
Some A are not B	Some C are B	Some C are A	0	0	2	8	30	144	302	1760	2550	18240
Some A are not B	Some B are not C	Some A are not C	0	0	2	8	30	144	302	1760	2550	18240

(Continued on next page)

Table 3—continued from previous page

Premise 1	Premise 2	Conclusion	Counts									
			CM ₁	M ₁	CM ₂	M ₂	CM ₃	M ₃	CM ₄	M ₄	CM ₅	M ₅
Some B are not A	Some C are not B	Some C are not A	0	0	2	8	30	144	302	1760	2550	18240
All A are B	Some B are not C	Some C are not A	2	2	12	20	56	152	240	1040	992	6752
All B are A	Some C are not B	Some A are not C	2	2	12	20	56	152	240	1040	992	6752
Some A are not B	All B are C	Some C are not A	2	2	12	20	56	152	240	1040	992	6752
Some B are not A	All C are B	Some A are not C	2	2	12	20	56	152	240	1040	992	6752
All B are A	Some B are C	Some A are not C	1	1	7	11	37	91	175	671	781	4651
All B are A	Some C are B	Some A are not C	1	1	7	11	37	91	175	671	781	4651
All B are A	Some B are not C	Some A are C	1	1	7	11	37	91	175	671	781	4651
All B are A	Some B are not C	Some C are A	1	1	7	11	37	91	175	671	781	4651
Some A are B	All B are C	Some C are not A	1	1	7	11	37	91	175	671	781	4651
Some B are A	All B are C	Some C are not A	1	1	7	11	37	91	175	671	781	4651
No A are B	Some B are not C	Some C are not A	1	1	7	11	37	91	175	671	781	4651
No B are A	Some B are not C	Some C are not A	1	1	7	11	37	91	175	671	781	4651
Some B are not A	All B are C	Some A are C	1	1	7	11	37	91	175	671	781	4651
Some B are not A	All B are C	Some C are A	1	1	7	11	37	91	175	671	781	4651
Some B are not A	No B are C	Some A are not C	1	1	7	11	37	91	175	671	781	4651
Some B are not A	No C are B	Some A are not C	1	1	7	11	37	91	175	671	781	4651
Some A are B	Some C are not B	Some A are not C	0	0	4	8	54	144	496	1760	3870	18240
Some A are B	Some C are not B	Some C are not A	0	0	4	8	54	144	496	1760	3870	18240
Some B are A	Some C are not B	Some A are not C	0	0	4	8	54	144	496	1760	3870	18240
Some B are A	Some C are not B	Some C are not A	0	0	4	8	54	144	496	1760	3870	18240
Some A are not B	Some B are C	Some A are not C	0	0	4	8	54	144	496	1760	3870	18240
Some A are not B	Some B are C	Some C are not A	0	0	4	8	54	144	496	1760	3870	18240
Some A are not B	Some C are B	Some A are not C	0	0	4	8	54	144	496	1760	3870	18240
Some A are not B	Some C are B	Some C are not A	0	0	4	8	54	144	496	1760	3870	18240
Some A are not B	Some B are not C	Some A are C	0	0	4	8	54	144	496	1760	3870	18240
Some A are not B	Some B are not C	Some C are A	0	0	4	8	54	144	496	1760	3870	18240
Some B are not A	Some C are not B	Some A are C	0	0	4	8	54	144	496	1760	3870	18240
Some B are not A	Some C are not B	Some C are A	0	0	4	8	54	144	496	1760	3870	18240
Some A are B	Some B are C	Some A are not C	1	1	11	17	91	205	671	2129	4651	20341
Some A are B	Some B are C	Some C are not A	1	1	11	17	91	205	671	2129	4651	20341
Some A are B	Some C are B	Some A are not C	1	1	11	17	91	205	671	2129	4651	20341
Some A are B	Some C are B	Some C are not A	1	1	11	17	91	205	671	2129	4651	20341
Some B are A	Some B are C	Some A are not C	1	1	11	17	91	205	671	2129	4651	20341
Some B are A	Some B are C	Some C are not A	1	1	11	17	91	205	671	2129	4651	20341
Some B are A	Some C are B	Some A are not C	1	1	11	17	91	205	671	2129	4651	20341
Some B are A	Some C are B	Some C are not A	1	1	11	17	91	205	671	2129	4651	20341
Some A are B	Some B are not C	Some A are C	1	1	11	17	91	205	671	2129	4651	20341
Some A are B	Some B are not C	Some C are A	1	1	11	17	91	205	671	2129	4651	20341
Some B are A	Some B are not C	Some A are C	1	1	11	17	91	205	671	2129	4651	20341
Some B are A	Some B are not C	Some C are A	1	1	11	17	91	205	671	2129	4651	20341

(Continued on next page)

Table 3—continued from previous page

Premise 1	Premise 2	Conclusion	Counts									
			CM ₁	M ₁	CM ₂	M ₂	CM ₃	M ₃	CM ₄	M ₄	CM ₅	M ₅
Some B are not A	Some B are C	Some A are C	1	1	11	17	91	205	671	2129	4651	20341
Some B are not A	Some B are C	Some C are A	1	1	11	17	91	205	671	2129	4651	20341
Some B are not A	Some C are B	Some A are C	1	1	11	17	91	205	671	2129	4651	20341
Some B are not A	Some C are B	Some C are A	1	1	11	17	91	205	671	2129	4651	20341
Some A are not B	Some C are not B	Some A are not C	1	1	11	17	91	205	671	2129	4651	20341
Some A are not B	Some C are not B	Some C are not A	1	1	11	17	91	205	671	2129	4651	20341
Some B are not A	Some B are not C	Some A are not C	1	1	11	17	91	205	671	2129	4651	20341
Some B are not A	Some B are not C	Some C are not A	1	1	11	17	91	205	671	2129	4651	20341
All A are B	All B are C	Some A are C	3	4	9	16	27	64	81	256	243	1024
All A are B	All B are C	Some C are A	3	4	9	16	27	64	81	256	243	1024
All B are A	All C are B	Some A are C	3	4	9	16	27	64	81	256	243	1024
All B are A	All C are B	Some C are A	3	4	9	16	27	64	81	256	243	1024
All A are B	No B are C	Some A are not C	3	4	9	16	27	64	81	256	243	1024
All A are B	No B are C	Some C are not A	3	4	9	16	27	64	81	256	243	1024
All A are B	No C are B	Some A are not C	3	4	9	16	27	64	81	256	243	1024
All A are B	No C are B	Some C are not A	3	4	9	16	27	64	81	256	243	1024
No A are B	All C are B	Some A are not C	3	4	9	16	27	64	81	256	243	1024
No A are B	All C are B	Some C are not A	3	4	9	16	27	64	81	256	243	1024
No B are A	All C are B	Some A are not C	3	4	9	16	27	64	81	256	243	1024
No B are A	All C are B	Some C are not A	3	4	9	16	27	64	81	256	243	1024
Some A are B	Some B are not C	Some C are not A	1	1	13	17	115	205	865	2129	5971	20341
Some B are A	Some B are not C	Some C are not A	1	1	13	17	115	205	865	2129	5971	20341
Some B are not A	Some B are C	Some A are not C	1	1	13	17	115	205	865	2129	5971	20341
Some B are not A	Some C are B	Some A are not C	1	1	13	17	115	205	865	2129	5971	20341
Some B are not A	Some B are not C	Some A are C	1	1	13	17	115	205	865	2129	5971	20341
Some B are not A	Some B are not C	Some C are A	1	1	13	17	115	205	865	2129	5971	20341
All A are B	Some B are C	Some A are C	1	2	9	20	61	152	369	1040	2101	6752
All A are B	Some B are C	Some C are A	1	2	9	20	61	152	369	1040	2101	6752
All A are B	Some C are B	Some A are C	1	2	9	20	61	152	369	1040	2101	6752
All A are B	Some C are B	Some C are A	1	2	9	20	61	152	369	1040	2101	6752
All A are B	Some B are not C	Some A are not C	1	2	9	20	61	152	369	1040	2101	6752
All B are A	Some C are not B	Some C are not A	1	2	9	20	61	152	369	1040	2101	6752
Some A are B	All C are B	Some A are C	1	2	9	20	61	152	369	1040	2101	6752
Some A are B	All C are B	Some C are A	1	2	9	20	61	152	369	1040	2101	6752
Some B are A	All C are B	Some A are C	1	2	9	20	61	152	369	1040	2101	6752
Some B are A	All C are B	Some C are A	1	2	9	20	61	152	369	1040	2101	6752
No A are B	Some C are not B	Some A are C	1	2	9	20	61	152	369	1040	2101	6752
No A are B	Some C are not B	Some C are A	1	2	9	20	61	152	369	1040	2101	6752
No B are A	Some C are not B	Some A are C	1	2	9	20	61	152	369	1040	2101	6752
No B are A	Some C are not B	Some C are A	1	2	9	20	61	152	369	1040	2101	6752
No B are A	Some C are not B	Some A are A	1	2	9	20	61	152	369	1040	2101	6752
Some A are not B	All B are C	Some A are not C	1	2	9	20	61	152	369	1040	2101	6752

(Continued on next page)

Table 3—continued from previous page

Premise 1	Premise 2	Conclusion	Counts									
			CM ₁	M ₁	CM ₂	M ₂	CM ₃	M ₃	CM ₄	M ₄	CM ₅	M ₅
Some B are not A	All C are B	Some C are not A	1	2	9	20	61	152	369	1040	2101	6752
Some A are not B	No B are C	Some A are C	1	2	9	20	61	152	369	1040	2101	6752
Some A are not B	No B are C	Some C are A	1	2	9	20	61	152	369	1040	2101	6752
Some A are not B	No C are B	Some A are C	1	2	9	20	61	152	369	1040	2101	6752
Some A are not B	No C are B	Some C are A	1	2	9	20	61	152	369	1040	2101	6752
Some A are not B	Some B are not C	Some C are not A	0	0	8	8	96	144	800	1760	5760	18240
Some B are not A	Some C are not B	Some A are not C	0	0	8	8	96	144	800	1760	5760	18240
All A are B	All C are B	Some A are C	4	5	16	25	64	125	256	625	1024	3125
All A are B	All C are B	Some C are A	4	5	16	25	64	125	256	625	1024	3125
All A are B	All C are B	Some A are not C	4	5	16	25	64	125	256	625	1024	3125
All A are B	All C are B	Some C are not A	4	5	16	25	64	125	256	625	1024	3125
All B are A	All B are C	Some A are not C	4	5	16	25	64	125	256	625	1024	3125
All B are A	All B are C	Some C are not A	4	5	16	25	64	125	256	625	1024	3125
All B are A	No B are C	Some A are C	4	5	16	25	64	125	256	625	1024	3125
All B are A	No B are C	Some C are A	4	5	16	25	64	125	256	625	1024	3125
All B are A	No B are C	Some C are not A	4	5	16	25	64	125	256	625	1024	3125
All B are A	No C are B	Some A are C	4	5	16	25	64	125	256	625	1024	3125
All B are A	No C are B	Some C are A	4	5	16	25	64	125	256	625	1024	3125
All B are A	No C are B	Some C are not A	4	5	16	25	64	125	256	625	1024	3125
No A are B	All B are C	Some A are C	4	5	16	25	64	125	256	625	1024	3125
No A are B	All B are C	Some C are A	4	5	16	25	64	125	256	625	1024	3125
No A are B	All B are C	Some A are not C	4	5	16	25	64	125	256	625	1024	3125
No B are A	All B are C	Some A are C	4	5	16	25	64	125	256	625	1024	3125
No B are A	All B are C	Some C are A	4	5	16	25	64	125	256	625	1024	3125
No B are A	All B are C	Some A are not C	4	5	16	25	64	125	256	625	1024	3125
No A are B	No B are C	Some A are C	4	5	16	25	64	125	256	625	1024	3125
No A are B	No B are C	Some C are A	4	5	16	25	64	125	256	625	1024	3125
No A are B	No B are C	Some C are not A	4	5	16	25	64	125	256	625	1024	3125
No A are B	No C are B	Some A are C	4	5	16	25	64	125	256	625	1024	3125
No A are B	No C are B	Some C are A	4	5	16	25	64	125	256	625	1024	3125
No A are B	No C are B	Some A are not C	4	5	16	25	64	125	256	625	1024	3125
No A are B	No C are B	Some C are not A	4	5	16	25	64	125	256	625	1024	3125
No B are A	No B are C	Some A are C	4	5	16	25	64	125	256	625	1024	3125
No B are A	No B are C	Some C are A	4	5	16	25	64	125	256	625	1024	3125
No B are A	No B are C	Some A are not C	4	5	16	25	64	125	256	625	1024	3125
No B are A	No B are C	Some C are not A	4	5	16	25	64	125	256	625	1024	3125
No B are A	No C are B	Some A are C	4	5	16	25	64	125	256	625	1024	3125
No B are A	No C are B	Some C are A	4	5	16	25	64	125	256	625	1024	3125
No B are A	No C are B	Some A are not C	4	5	16	25	64	125	256	625	1024	3125
No B are A	No C are B	Some C are not A	4	5	16	25	64	125	256	625	1024	3125

(Continued on next page)

Table 3—continued from previous page

Premise 1	Premise 2	Conclusion	Counts									
			CM ₁	M ₁	CM ₂	M ₂	CM ₃	M ₃	CM ₄	M ₄	CM ₅	M ₅
All A are B	Some B are C	Some A are not C	2	2	16	20	98	152	544	1040	2882	6752
All A are B	Some C are B	Some A are not C	2	2	16	20	98	152	544	1040	2882	6752
All A are B	Some B are not C	Some A are C	2	2	16	20	98	152	544	1040	2882	6752
All A are B	Some B are not C	Some C are A	2	2	16	20	98	152	544	1040	2882	6752
Some A are B	All C are B	Some C are not A	2	2	16	20	98	152	544	1040	2882	6752
Some B are A	All C are B	Some C are not A	2	2	16	20	98	152	544	1040	2882	6752
No A are B	Some C are not B	Some A are not C	2	2	16	20	98	152	544	1040	2882	6752
No B are A	Some C are not B	Some A are not C	2	2	16	20	98	152	544	1040	2882	6752
Some B are not A	All C are B	Some A are C	2	2	16	20	98	152	544	1040	2882	6752
Some B are not A	All C are B	Some C are A	2	2	16	20	98	152	544	1040	2882	6752
Some A are not B	No B are C	Some C are not A	2	2	16	20	98	152	544	1040	2882	6752
Some A are not B	No C are B	Some C are not A	2	2	16	20	98	152	544	1040	2882	6752
All B are A	Some B are C	Some C are not A	1	1	9	11	61	91	369	671	2101	4651
All B are A	Some C are B	Some C are not A	1	1	9	11	61	91	369	671	2101	4651
All A are B	Some C are not B	Some A are C	1	1	9	11	61	91	369	671	2101	4651
All A are B	Some C are not B	Some C are A	1	1	9	11	61	91	369	671	2101	4651
All A are B	Some C are not B	Some A are not C	1	1	9	11	61	91	369	671	2101	4651
All B are A	Some B are not C	Some C are not A	1	1	9	11	61	91	369	671	2101	4651
Some A are B	All B are C	Some A are not C	1	1	9	11	61	91	369	671	2101	4651
Some B are A	All B are C	Some A are not C	1	1	9	11	61	91	369	671	2101	4651
Some A are B	No B are C	Some A are C	1	1	9	11	61	91	369	671	2101	4651
Some A are B	No B are C	Some C are A	1	1	9	11	61	91	369	671	2101	4651
Some A are B	No B are C	Some C are not A	1	1	9	11	61	91	369	671	2101	4651
Some A are B	No C are B	Some A are C	1	1	9	11	61	91	369	671	2101	4651
Some A are B	No C are B	Some C are A	1	1	9	11	61	91	369	671	2101	4651
Some A are B	No C are B	Some C are not A	1	1	9	11	61	91	369	671	2101	4651
Some B are A	No B are C	Some A are C	1	1	9	11	61	91	369	671	2101	4651
Some B are A	No B are C	Some C are not A	1	1	9	11	61	91	369	671	2101	4651
Some B are A	No C are B	Some A are C	1	1	9	11	61	91	369	671	2101	4651
Some B are A	No C are B	Some C are A	1	1	9	11	61	91	369	671	2101	4651
Some B are A	No C are B	Some C are not A	1	1	9	11	61	91	369	671	2101	4651
No A are B	Some B are C	Some A are C	1	1	9	11	61	91	369	671	2101	4651
No A are B	Some B are C	Some C are A	1	1	9	11	61	91	369	671	2101	4651
No A are B	Some B are C	Some A are not C	1	1	9	11	61	91	369	671	2101	4651
No A are B	Some C are B	Some A are C	1	1	9	11	61	91	369	671	2101	4651
No A are B	Some C are B	Some C are A	1	1	9	11	61	91	369	671	2101	4651
No A are B	Some C are B	Some A are not C	1	1	9	11	61	91	369	671	2101	4651
No B are A	Some B are C	Some A are C	1	1	9	11	61	91	369	671	2101	4651
No B are A	Some B are C	Some C are A	1	1	9	11	61	91	369	671	2101	4651
No B are A	Some B are C	Some A are not C	1	1	9	11	61	91	369	671	2101	4651

(Continued on next page)

Table 3—continued from previous page

Premise 1	Premise 2	Conclusion	Counts									
			CM ₁	M ₁	CM ₂	M ₂	CM ₃	M ₃	CM ₄	M ₄	CM ₅	M ₅
No B are A	Some C are B	Some A are C	1	1	9	11	61	91	369	671	2101	4651
No B are A	Some C are B	Some C are A	1	1	9	11	61	91	369	671	2101	4651
No B are A	Some C are B	Some A are not C	1	1	9	11	61	91	369	671	2101	4651
No A are B	Some B are not C	Some A are C	1	1	9	11	61	91	369	671	2101	4651
No A are B	Some B are not C	Some C are A	1	1	9	11	61	91	369	671	2101	4651
No A are B	Some B are not C	Some A are not C	1	1	9	11	61	91	369	671	2101	4651
No B are A	Some B are not C	Some A are C	1	1	9	11	61	91	369	671	2101	4651
No B are A	Some B are not C	Some C are A	1	1	9	11	61	91	369	671	2101	4651
No B are A	Some B are not C	Some A are not C	1	1	9	11	61	91	369	671	2101	4651
Some A are not B	All C are B	Some A are C	1	1	9	11	61	91	369	671	2101	4651
Some A are not B	All C are B	Some C are A	1	1	9	11	61	91	369	671	2101	4651
Some A are not B	All C are B	Some C are not A	1	1	9	11	61	91	369	671	2101	4651
Some B are not A	All B are C	Some A are not C	1	1	9	11	61	91	369	671	2101	4651
Some B are not A	No B are C	Some A are C	1	1	9	11	61	91	369	671	2101	4651
Some B are not A	No B are C	Some C are A	1	1	9	11	61	91	369	671	2101	4651
Some B are not A	No B are C	Some C are not A	1	1	9	11	61	91	369	671	2101	4651
Some B are not A	No C are B	Some A are C	1	1	9	11	61	91	369	671	2101	4651
Some B are not A	No C are B	Some C are A	1	1	9	11	61	91	369	671	2101	4651
Some B are not A	No C are B	Some C are not A	1	1	9	11	61	91	369	671	2101	4651
All B are A	Some B are C	All C are A	0	1	2	11	30	91	302	671	2550	4651
All B are A	Some C are B	All C are A	0	1	2	11	30	91	302	671	2550	4651
All A are B	Some C are not B	All A are C	0	1	2	11	30	91	302	671	2550	4651
All A are B	Some C are not B	No A are C	0	1	2	11	30	91	302	671	2550	4651
All A are B	Some C are not B	No C are A	0	1	2	11	30	91	302	671	2550	4651
All B are A	Some B are not C	All C are A	0	1	2	11	30	91	302	671	2550	4651
Some A are B	All B are C	All A are C	0	1	2	11	30	91	302	671	2550	4651
Some B are A	All B are C	All A are C	0	1	2	11	30	91	302	671	2550	4651
Some A are B	No B are C	All C are A	0	1	2	11	30	91	302	671	2550	4651
Some A are B	No B are C	No A are C	0	1	2	11	30	91	302	671	2550	4651
Some A are B	No B are C	No C are A	0	1	2	11	30	91	302	671	2550	4651
Some A are B	No C are B	All C are A	0	1	2	11	30	91	302	671	2550	4651
Some A are B	No C are B	No A are C	0	1	2	11	30	91	302	671	2550	4651
Some A are B	No C are B	No C are A	0	1	2	11	30	91	302	671	2550	4651
Some B are A	No B are C	All C are A	0	1	2	11	30	91	302	671	2550	4651
Some B are A	No B are C	No A are C	0	1	2	11	30	91	302	671	2550	4651
Some B are A	No B are C	No C are A	0	1	2	11	30	91	302	671	2550	4651
Some B are A	No C are B	All C are A	0	1	2	11	30	91	302	671	2550	4651
Some B are A	No C are B	No A are C	0	1	2	11	30	91	302	671	2550	4651
Some B are A	No C are B	No C are A	0	1	2	11	30	91	302	671	2550	4651
No A are B	Some B are C	All A are C	0	1	2	11	30	91	302	671	2550	4651
No A are B	Some B are C	No A are C	0	1	2	11	30	91	302	671	2550	4651

(Continued on next page)

Table 3—continued from previous page

Premise 1	Premise 2	Conclusion	Counts									
			CM ₁	M ₁	CM ₂	M ₂	CM ₃	M ₃	CM ₄	M ₄	CM ₅	M ₅
No A are B	Some B are C	No C are A	0	1	2	11	30	91	302	671	2550	4651
No A are B	Some C are B	All A are C	0	1	2	11	30	91	302	671	2550	4651
No A are B	Some C are B	No A are C	0	1	2	11	30	91	302	671	2550	4651
No A are B	Some C are B	No C are A	0	1	2	11	30	91	302	671	2550	4651
No B are A	Some B are C	All A are C	0	1	2	11	30	91	302	671	2550	4651
No B are A	Some B are C	No A are C	0	1	2	11	30	91	302	671	2550	4651
No B are A	Some B are C	No C are A	0	1	2	11	30	91	302	671	2550	4651
No B are A	Some C are B	All A are C	0	1	2	11	30	91	302	671	2550	4651
No B are A	Some C are B	No A are C	0	1	2	11	30	91	302	671	2550	4651
No B are A	Some C are B	No C are A	0	1	2	11	30	91	302	671	2550	4651
No A are B	Some B are not C	All A are C	0	1	2	11	30	91	302	671	2550	4651
No A are B	Some B are not C	No A are C	0	1	2	11	30	91	302	671	2550	4651
No A are B	Some B are not C	No C are A	0	1	2	11	30	91	302	671	2550	4651
No B are A	Some B are not C	All A are C	0	1	2	11	30	91	302	671	2550	4651
No B are A	Some B are not C	No A are C	0	1	2	11	30	91	302	671	2550	4651
No B are A	Some B are not C	No C are A	0	1	2	11	30	91	302	671	2550	4651
Some A are not B	All C are B	All C are A	0	1	2	11	30	91	302	671	2550	4651
Some A are not B	All C are B	No A are C	0	1	2	11	30	91	302	671	2550	4651
Some A are not B	All C are B	No C are A	0	1	2	11	30	91	302	671	2550	4651
Some B are not A	All B are C	All A are C	0	1	2	11	30	91	302	671	2550	4651
Some B are not A	No B are C	All C are A	0	1	2	11	30	91	302	671	2550	4651
Some B are not A	No B are C	No A are C	0	1	2	11	30	91	302	671	2550	4651
Some B are not A	No B are C	No C are A	0	1	2	11	30	91	302	671	2550	4651
Some B are not A	No C are B	All C are A	0	1	2	11	30	91	302	671	2550	4651
Some B are not A	No C are B	No A are C	0	1	2	11	30	91	302	671	2550	4651
Some B are not A	No C are B	No C are A	0	1	2	11	30	91	302	671	2550	4651
All A are B	Some B are C	All A are C	0	2	4	20	54	152	496	1040	3870	6752
All A are B	Some C are B	All A are C	0	2	4	20	54	152	496	1040	3870	6752
All A are B	Some B are not C	No A are C	0	2	4	20	54	152	496	1040	3870	6752
All A are B	Some B are not C	No C are A	0	2	4	20	54	152	496	1040	3870	6752
Some A are B	All C are B	All C are A	0	2	4	20	54	152	496	1040	3870	6752
Some B are A	All C are B	All C are A	0	2	4	20	54	152	496	1040	3870	6752
No A are B	Some C are not B	All A are C	0	2	4	20	54	152	496	1040	3870	6752
No B are A	Some C are not B	All A are C	0	2	4	20	54	152	496	1040	3870	6752
Some B are not A	All C are B	No A are C	0	2	4	20	54	152	496	1040	3870	6752
Some B are not A	All C are B	No C are A	0	2	4	20	54	152	496	1040	3870	6752
Some A are not B	No B are C	All C are A	0	2	4	20	54	152	496	1040	3870	6752
Some A are not B	No C are B	All C are A	0	2	4	20	54	152	496	1040	3870	6752
All A are B	All C are B	All A are C	1	5	9	25	61	125	369	625	2101	3125
All A are B	All C are B	All C are A	1	5	9	25	61	125	369	625	2101	3125
All A are B	All C are B	No A are C	1	5	9	25	61	125	369	625	2101	3125

(Continued on next page)

Table 3—continued from previous page

Premise 1	Premise 2	Conclusion	Counts									
			CM ₁	M ₁	CM ₂	M ₂	CM ₃	M ₃	CM ₄	M ₄	CM ₅	M ₅
All A are B	All C are B	No C are A	1	5	9	25	61	125	369	625	2101	3125
All B are A	All B are C	All A are C	1	5	9	25	61	125	369	625	2101	3125
All B are A	All B are C	All C are A	1	5	9	25	61	125	369	625	2101	3125
All B are A	No B are C	All C are A	1	5	9	25	61	125	369	625	2101	3125
All B are A	No B are C	No A are C	1	5	9	25	61	125	369	625	2101	3125
All B are A	No B are C	No C are A	1	5	9	25	61	125	369	625	2101	3125
All B are A	No C are B	All C are A	1	5	9	25	61	125	369	625	2101	3125
All B are A	No C are B	No A are C	1	5	9	25	61	125	369	625	2101	3125
All B are A	No C are B	No C are A	1	5	9	25	61	125	369	625	2101	3125
No A are B	All B are C	All A are C	1	5	9	25	61	125	369	625	2101	3125
No A are B	All B are C	No A are C	1	5	9	25	61	125	369	625	2101	3125
No A are B	All B are C	No C are A	1	5	9	25	61	125	369	625	2101	3125
No B are A	All B are C	All A are C	1	5	9	25	61	125	369	625	2101	3125
No B are A	All B are C	No A are C	1	5	9	25	61	125	369	625	2101	3125
No B are A	All B are C	No C are A	1	5	9	25	61	125	369	625	2101	3125
No A are B	No B are C	All A are C	1	5	9	25	61	125	369	625	2101	3125
No A are B	No B are C	All A are C	1	5	9	25	61	125	369	625	2101	3125
No A are B	No B are C	All C are A	1	5	9	25	61	125	369	625	2101	3125
No A are B	No B are C	No A are C	1	5	9	25	61	125	369	625	2101	3125
No A are B	No B are C	No C are A	1	5	9	25	61	125	369	625	2101	3125
No A are B	No C are B	All A are C	1	5	9	25	61	125	369	625	2101	3125
No A are B	No C are B	All C are A	1	5	9	25	61	125	369	625	2101	3125
No A are B	No C are B	No A are C	1	5	9	25	61	125	369	625	2101	3125
No A are B	No C are B	No C are A	1	5	9	25	61	125	369	625	2101	3125
No B are A	No B are C	All A are C	1	5	9	25	61	125	369	625	2101	3125
No B are A	No B are C	All C are A	1	5	9	25	61	125	369	625	2101	3125
No B are A	No B are C	No A are C	1	5	9	25	61	125	369	625	2101	3125
No B are A	No B are C	No C are A	1	5	9	25	61	125	369	625	2101	3125
No B are A	No B are C	No C are A	1	5	9	25	61	125	369	625	2101	3125
No B are A	No C are B	All A are C	1	5	9	25	61	125	369	625	2101	3125
No B are A	No C are B	All C are A	1	5	9	25	61	125	369	625	2101	3125
No B are A	No C are B	No A are C	1	5	9	25	61	125	369	625	2101	3125
No B are A	No C are B	No C are A	1	5	9	25	61	125	369	625	2101	3125
Some A are not B	Some B are not C	All C are A	0	0	0	8	48	144	960	1760	12480	18240
Some B are not A	Some C are not B	All A are C	0	0	0	8	48	144	960	1760	12480	18240
All A are B	Some B are C	No A are C	1	2	11	20	91	152	671	1040	4651	6752
All A are B	Some B are C	No C are A	1	2	11	20	91	152	671	1040	4651	6752
All A are B	Some C are B	No A are C	1	2	11	20	91	152	671	1040	4651	6752
All A are B	Some C are B	No C are A	1	2	11	20	91	152	671	1040	4651	6752
All A are B	Some B are not C	All A are C	1	2	11	20	91	152	671	1040	4651	6752
All B are A	Some C are not B	All C are A	1	2	11	20	91	152	671	1040	4651	6752
Some A are B	All C are B	No A are C	1	2	11	20	91	152	671	1040	4651	6752
Some A are B	All C are B	No C are A	1	2	11	20	91	152	671	1040	4651	6752

(Continued on next page)

Table 3—continued from previous page

Premise 1	Premise 2	Conclusion	Counts									
			CM ₁	M ₁	CM ₂	M ₂	CM ₃	M ₃	CM ₄	M ₄	CM ₅	M ₅
Some B are A	All C are B	No A are C	1	2	11	20	91	152	671	1040	4651	6752
Some B are A	All C are B	No C are A	1	2	11	20	91	152	671	1040	4651	6752
No A are B	Some C are not B	No A are C	1	2	11	20	91	152	671	1040	4651	6752
No A are B	Some C are not B	No C are A	1	2	11	20	91	152	671	1040	4651	6752
No B are A	Some C are not B	No A are C	1	2	11	20	91	152	671	1040	4651	6752
No B are A	Some C are not B	No C are A	1	2	11	20	91	152	671	1040	4651	6752
Some A are not B	All B are C	All A are C	1	2	11	20	91	152	671	1040	4651	6752
Some B are not A	All C are B	All C are A	1	2	11	20	91	152	671	1040	4651	6752
Some A are not B	No B are C	No A are C	1	2	11	20	91	152	671	1040	4651	6752
Some A are not B	No B are C	No C are A	1	2	11	20	91	152	671	1040	4651	6752
Some A are not B	No C are B	No A are C	1	2	11	20	91	152	671	1040	4651	6752
Some A are not B	No C are B	No C are A	1	2	11	20	91	152	671	1040	4651	6752
Some A are B	Some B are not C	All C are A	0	1	4	17	90	205	1264	2129	14370	20341
Some B are A	Some B are not C	All C are A	0	1	4	17	90	205	1264	2129	14370	20341
Some B are not A	Some B are C	All A are C	0	1	4	17	90	205	1264	2129	14370	20341
Some B are not A	Some C are B	All A are C	0	1	4	17	90	205	1264	2129	14370	20341
Some B are not A	Some B are not C	No A are C	0	1	4	17	90	205	1264	2129	14370	20341
Some B are not A	Some B are not C	No C are A	0	1	4	17	90	205	1264	2129	14370	20341
All A are B	All B are C	No A are C	1	4	7	16	37	64	175	256	781	1024
All A are B	All B are C	No C are A	1	4	7	16	37	64	175	256	781	1024
All B are A	All C are B	No A are C	1	4	7	16	37	64	175	256	781	1024
All B are A	All C are B	No C are A	1	4	7	16	37	64	175	256	781	1024
All A are B	No B are C	All A are C	1	4	7	16	37	64	175	256	781	1024
All A are B	No B are C	All C are A	1	4	7	16	37	64	175	256	781	1024
All A are B	No C are B	All A are C	1	4	7	16	37	64	175	256	781	1024
All A are B	No C are B	All C are A	1	4	7	16	37	64	175	256	781	1024
No A are B	All C are B	All A are C	1	4	7	16	37	64	175	256	781	1024
No A are B	All C are B	All C are A	1	4	7	16	37	64	175	256	781	1024
No B are A	All C are B	All A are C	1	4	7	16	37	64	175	256	781	1024
No B are A	All C are B	All C are A	1	4	7	16	37	64	175	256	781	1024
Some A are B	Some B are C	All A are C	0	1	6	17	114	205	1458	2129	15690	20341
Some A are B	Some B are C	All C are A	0	1	6	17	114	205	1458	2129	15690	20341
Some A are B	Some C are B	All A are C	0	1	6	17	114	205	1458	2129	15690	20341
Some A are B	Some C are B	All C are A	0	1	6	17	114	205	1458	2129	15690	20341
Some B are A	Some B are C	All A are C	0	1	6	17	114	205	1458	2129	15690	20341
Some B are A	Some B are C	All C are A	0	1	6	17	114	205	1458	2129	15690	20341
Some B are A	Some C are B	All A are C	0	1	6	17	114	205	1458	2129	15690	20341
Some B are A	Some C are B	All C are A	0	1	6	17	114	205	1458	2129	15690	20341
Some A are B	Some B are not C	No A are C	0	1	6	17	114	205	1458	2129	15690	20341
Some A are B	Some B are not C	No C are A	0	1	6	17	114	205	1458	2129	15690	20341
Some B are A	Some B are not C	No A are C	0	1	6	17	114	205	1458	2129	15690	20341

(Continued on next page)

Table 3—continued from previous page

Premise 1	Premise 2	Conclusion	Counts									
			CM ₁	M ₁	CM ₂	M ₂	CM ₃	M ₃	CM ₄	M ₄	CM ₅	M ₅
Some B are A	Some B are not C	No C are A	0	1	6	17	114	205	1458	2129	15690	20341
Some B are not A	Some B are C	No A are C	0	1	6	17	114	205	1458	2129	15690	20341
Some B are not A	Some B are C	No C are A	0	1	6	17	114	205	1458	2129	15690	20341
Some B are not A	Some C are B	No A are C	0	1	6	17	114	205	1458	2129	15690	20341
Some B are not A	Some C are B	No C are A	0	1	6	17	114	205	1458	2129	15690	20341
Some A are not B	Some C are not B	All A are C	0	1	6	17	114	205	1458	2129	15690	20341
Some A are not B	Some C are not B	All C are A	0	1	6	17	114	205	1458	2129	15690	20341
Some B are not A	Some B are not C	All A are C	0	1	6	17	114	205	1458	2129	15690	20341
Some B are not A	Some B are not C	All C are A	0	1	6	17	114	205	1458	2129	15690	20341
Some A are B	Some C are not B	All A are C	0	0	4	8	90	144	1264	1760	14370	18240
Some A are B	Some C are not B	All C are A	0	0	4	8	90	144	1264	1760	14370	18240
Some B are A	Some C are not B	All A are C	0	0	4	8	90	144	1264	1760	14370	18240
Some B are A	Some C are not B	All C are A	0	0	4	8	90	144	1264	1760	14370	18240
Some A are not B	Some B are C	All A are C	0	0	4	8	90	144	1264	1760	14370	18240
Some A are not B	Some B are C	All C are A	0	0	4	8	90	144	1264	1760	14370	18240
Some A are not B	Some C are B	All A are C	0	0	4	8	90	144	1264	1760	14370	18240
Some A are not B	Some C are B	All C are A	0	0	4	8	90	144	1264	1760	14370	18240
Some A are not B	Some B are not C	No A are C	0	0	4	8	90	144	1264	1760	14370	18240
Some A are not B	Some B are not C	No C are A	0	0	4	8	90	144	1264	1760	14370	18240
Some B are not A	Some C are not B	No A are C	0	0	4	8	90	144	1264	1760	14370	18240
Some B are not A	Some C are not B	No C are A	0	0	4	8	90	144	1264	1760	14370	18240
All B are A	Some B are C	All A are C	0	1	4	11	54	91	496	671	3870	4651
All B are A	Some C are B	All A are C	0	1	4	11	54	91	496	671	3870	4651
All B are A	Some B are not C	No A are C	0	1	4	11	54	91	496	671	3870	4651
All B are A	Some B are not C	No C are A	0	1	4	11	54	91	496	671	3870	4651
Some A are B	All B are C	All C are A	0	1	4	11	54	91	496	671	3870	4651
Some B are A	All B are C	All C are A	0	1	4	11	54	91	496	671	3870	4651
No A are B	Some B are not C	All C are A	0	1	4	11	54	91	496	671	3870	4651
No B are A	Some B are not C	All C are A	0	1	4	11	54	91	496	671	3870	4651
Some B are not A	All B are C	No A are C	0	1	4	11	54	91	496	671	3870	4651
Some B are not A	All B are C	No C are A	0	1	4	11	54	91	496	671	3870	4651
Some B are not A	No B are C	All A are C	0	1	4	11	54	91	496	671	3870	4651
Some B are not A	No C are B	All A are C	0	1	4	11	54	91	496	671	3870	4651
All A are B	Some B are not C	All C are A	0	2	8	20	96	152	800	1040	5760	6752
All B are A	Some C are not B	All A are C	0	2	8	20	96	152	800	1040	5760	6752
Some A are not B	All B are C	All C are A	0	2	8	20	96	152	800	1040	5760	6752
Some B are not A	All C are B	All A are C	0	2	8	20	96	152	800	1040	5760	6752
Some A are B	Some C are not B	No A are C	0	0	6	8	114	144	1458	1760	15690	18240
Some A are B	Some C are not B	No C are A	0	0	6	8	114	144	1458	1760	15690	18240
Some B are A	Some C are not B	No A are C	0	0	6	8	114	144	1458	1760	15690	18240
Some B are A	Some C are not B	No C are A	0	0	6	8	114	144	1458	1760	15690	18240

(Continued on next page)

Table 3—continued from previous page

Premise 1	Premise 2	Conclusion	Counts									
			CM ₁	M ₁	CM ₂	M ₂	CM ₃	M ₃	CM ₄	M ₄	CM ₅	M ₅
Some A are not B	Some B are C	No A are C	0	0	6	8	114	144	1458	1760	15690	18240
Some A are not B	Some B are C	No C are A	0	0	6	8	114	144	1458	1760	15690	18240
Some A are not B	Some C are B	No A are C	0	0	6	8	114	144	1458	1760	15690	18240
Some A are not B	Some C are B	No C are A	0	0	6	8	114	144	1458	1760	15690	18240
Some A are not B	Some B are not C	All A are C	0	0	6	8	114	144	1458	1760	15690	18240
Some B are not A	Some C are not B	All C are A	0	0	6	8	114	144	1458	1760	15690	18240
Some A are B	Some B are C	No A are C	1	1	15	17	175	205	1827	2129	17791	20341
Some A are B	Some B are C	No C are A	1	1	15	17	175	205	1827	2129	17791	20341
Some A are B	Some C are B	No A are C	1	1	15	17	175	205	1827	2129	17791	20341
Some A are B	Some C are B	No C are A	1	1	15	17	175	205	1827	2129	17791	20341
Some B are A	Some B are C	No A are C	1	1	15	17	175	205	1827	2129	17791	20341
Some B are A	Some B are C	No C are A	1	1	15	17	175	205	1827	2129	17791	20341
Some B are A	Some C are B	No A are C	1	1	15	17	175	205	1827	2129	17791	20341
Some B are A	Some C are B	No C are A	1	1	15	17	175	205	1827	2129	17791	20341
Some A are B	Some B are not C	All A are C	1	1	15	17	175	205	1827	2129	17791	20341
Some B are A	Some B are not C	All A are C	1	1	15	17	175	205	1827	2129	17791	20341
Some B are not A	Some B are C	All C are A	1	1	15	17	175	205	1827	2129	17791	20341
Some B are not A	Some C are B	All C are A	1	1	15	17	175	205	1827	2129	17791	20341
Some A are not B	Some C are not B	No A are C	1	1	15	17	175	205	1827	2129	17791	20341
Some A are not B	Some C are not B	No C are A	1	1	15	17	175	205	1827	2129	17791	20341
All A are B	Some B are C	All C are A	1	2	13	20	115	152	865	1040	5971	6752
All A are B	Some C are B	All C are A	1	2	13	20	115	152	865	1040	5971	6752
All B are A	Some C are not B	No A are C	1	2	13	20	115	152	865	1040	5971	6752
All B are A	Some C are not B	No C are A	1	2	13	20	115	152	865	1040	5971	6752
Some A are B	All C are B	All A are C	1	2	13	20	115	152	865	1040	5971	6752
Some B are A	All C are B	All A are C	1	2	13	20	115	152	865	1040	5971	6752
No A are B	Some C are not B	All C are A	1	2	13	20	115	152	865	1040	5971	6752
No B are A	Some C are not B	All C are A	1	2	13	20	115	152	865	1040	5971	6752
Some A are not B	All B are C	No A are C	1	2	13	20	115	152	865	1040	5971	6752
Some A are not B	All B are C	No C are A	1	2	13	20	115	152	865	1040	5971	6752
Some A are not B	No B are C	All A are C	1	2	13	20	115	152	865	1040	5971	6752
Some A are not B	No C are B	All A are C	1	2	13	20	115	152	865	1040	5971	6752
All B are A	All B are C	No A are C	2	5	16	25	98	125	544	625	2882	3125
All B are A	All B are C	No C are A	2	5	16	25	98	125	544	625	2882	3125
All B are A	No B are C	All A are C	2	5	16	25	98	125	544	625	2882	3125
All B are A	No C are B	All A are C	2	5	16	25	98	125	544	625	2882	3125
No A are B	All B are C	All C are A	2	5	16	25	98	125	544	625	2882	3125
No B are A	All B are C	All C are A	2	5	16	25	98	125	544	625	2882	3125
All A are B	All B are C	All C are A	2	4	12	16	56	64	240	256	992	1024
All B are A	All C are B	All A are C	2	4	12	16	56	64	240	256	992	1024
All A are B	All B are C	Some A are not C	4	4	16	16	64	64	256	256	1024	1024

(Continued on next page)

Table 3—continued from previous page

Premise 1	Premise 2	Conclusion	Counts									
			CM ₁	M ₁	CM ₂	M ₂	CM ₃	M ₃	CM ₄	M ₄	CM ₅	M ₅
All B are A	All C are B	Some C are not A	4	4	16	16	64	64	256	256	1024	1024
All A are B	No B are C	Some A are C	4	4	16	16	64	64	256	256	1024	1024
All A are B	No B are C	Some C are A	4	4	16	16	64	64	256	256	1024	1024
All A are B	No C are B	Some A are C	4	4	16	16	64	64	256	256	1024	1024
All A are B	No C are B	Some C are A	4	4	16	16	64	64	256	256	1024	1024
No A are B	All C are B	Some A are C	4	4	16	16	64	64	256	256	1024	1024
No A are B	All C are B	Some C are A	4	4	16	16	64	64	256	256	1024	1024
No B are A	All C are B	Some A are C	4	4	16	16	64	64	256	256	1024	1024
No B are A	All C are B	Some C are A	4	4	16	16	64	64	256	256	1024	1024
All B are A	Some B are C	No A are C	1	1	11	11	91	91	671	671	4651	4651
All B are A	Some B are C	No C are A	1	1	11	11	91	91	671	671	4651	4651
All B are A	Some C are B	No A are C	1	1	11	11	91	91	671	671	4651	4651
All B are A	Some C are B	No C are A	1	1	11	11	91	91	671	671	4651	4651
All A are B	Some C are not B	All C are A	1	1	11	11	91	91	671	671	4651	4651
All B are A	Some B are not C	All A are C	1	1	11	11	91	91	671	671	4651	4651
Some A are B	All B are C	No A are C	1	1	11	11	91	91	671	671	4651	4651
Some A are B	All B are C	No C are A	1	1	11	11	91	91	671	671	4651	4651
Some B are A	All B are C	No A are C	1	1	11	11	91	91	671	671	4651	4651
Some B are A	All B are C	No C are A	1	1	11	11	91	91	671	671	4651	4651
Some A are B	No B are C	All A are C	1	1	11	11	91	91	671	671	4651	4651
Some A are B	No C are B	All A are C	1	1	11	11	91	91	671	671	4651	4651
Some B are A	No B are C	All A are C	1	1	11	11	91	91	671	671	4651	4651
Some B are A	No C are B	All A are C	1	1	11	11	91	91	671	671	4651	4651
No A are B	Some B are C	All C are A	1	1	11	11	91	91	671	671	4651	4651
No A are B	Some C are B	All C are A	1	1	11	11	91	91	671	671	4651	4651
No B are A	Some B are C	All C are A	1	1	11	11	91	91	671	671	4651	4651
No B are A	Some C are B	All C are A	1	1	11	11	91	91	671	671	4651	4651
Some A are not B	All C are B	All A are C	1	1	11	11	91	91	671	671	4651	4651
Some B are not A	All B are C	All C are A	1	1	11	11	91	91	671	671	4651	4651

B Models of the premises

Table 4: Conjectured closed forms for the number of models with n individuals of the premises

<i>Premise 1</i>	<i>Premise 2</i>	<i>Models</i>
All A are B	All B are C	2^{2n}
All A are B	No B are C	2^{2n}
All A are B	No C are B	2^{2n}
All B are A	All C are B	2^{2n}
No A are B	All C are B	2^{2n}
No B are A	All C are B	2^{2n}
All A are B	All C are B	5^n
All B are A	All B are C	5^n
All B are A	No B are C	5^n
All B are A	No C are B	5^n
No A are B	All B are C	5^n
No A are B	No B are C	5^n
No A are B	No C are B	5^n
No B are A	All B are C	5^n
No B are A	No B are C	5^n
No B are A	No C are B	5^n
All A are B	Some C are not B	$6^n - 5^n$
All B are A	Some B are C	$6^n - 5^n$
All B are A	Some B are not C	$6^n - 5^n$
All B are A	Some C are B	$6^n - 5^n$
No A are B	Some B are C	$6^n - 5^n$
No A are B	Some B are not C	$6^n - 5^n$
No A are B	Some C are B	$6^n - 5^n$
No B are A	Some B are C	$6^n - 5^n$
No B are A	Some B are not C	$6^n - 5^n$
No B are A	Some C are B	$6^n - 5^n$
Some A are B	All B are C	$6^n - 5^n$
Some A are B	No B are C	$6^n - 5^n$
Some A are B	No C are B	$6^n - 5^n$
Some A are not B	All C are B	$6^n - 5^n$
Some B are A	All B are C	$6^n - 5^n$
Some B are A	No B are C	$6^n - 5^n$
Some B are A	No C are B	$6^n - 5^n$
Some B are not A	All B are C	$6^n - 5^n$
Some B are not A	No B are C	$6^n - 5^n$
Some B are not A	No C are B	$6^n - 5^n$
All A are B	Some B are C	$6^n - 4^n$
All A are B	Some B are not C	$6^n - 4^n$
All A are B	Some C are B	$6^n - 4^n$
All B are A	Some C are not B	$6^n - 4^n$
No A are B	Some C are not B	$6^n - 4^n$
No B are A	Some C are not B	$6^n - 4^n$
Some A are B	All C are B	$6^n - 4^n$
Some A are not B	All B are C	$6^n - 4^n$
Some A are not B	No B are C	$6^n - 4^n$
Some A are not B	No C are B	$6^n - 4^n$
Some B are A	All C are B	$6^n - 4^n$
Some B are not A	All C are B	$6^n - 4^n$
Some A are B	Some C are not B	$8^n + 4^n - 2 \cdot 6^n$
Some A are not B	Some B are C	$8^n + 4^n - 2 \cdot 6^n$
Some A are not B	Some B are not C	$8^n + 4^n - 2 \cdot 6^n$
Some A are not B	Some C are B	$8^n + 4^n - 2 \cdot 6^n$
Some B are A	Some C are not B	$8^n + 4^n - 2 \cdot 6^n$
Some B are not A	Some C are not B	$8^n + 4^n - 2 \cdot 6^n$
Some A are B	Some B are C	$8^n + 5^n - 2 \cdot 6^n$
Some A are B	Some B are not C	$8^n + 5^n - 2 \cdot 6^n$
Some A are B	Some C are B	$8^n + 5^n - 2 \cdot 6^n$

(Continued on next page)

Table 4—continued from previous page

<i>Premise 1</i>	<i>Premise 2</i>	<i>Models</i>
Some A are not B	Some C are not B	$8^n + 5^n - 2 \cdot 6^n$
Some B are A	Some B are C	$8^n + 5^n - 2 \cdot 6^n$
Some B are A	Some B are not C	$8^n + 5^n - 2 \cdot 6^n$
Some B are A	Some C are B	$8^n + 5^n - 2 \cdot 6^n$
Some B are not A	Some B are C	$8^n + 5^n - 2 \cdot 6^n$
Some B are not A	Some B are not C	$8^n + 5^n - 2 \cdot 6^n$
Some B are not A	Some C are B	$8^n + 5^n - 2 \cdot 6^n$

C Countermodels of the conclusions

Table 5: Conjectured closed forms for the number of models of the premises which are countermodels of the conclusions (with n individuals). Conjectures for the premise model counts are also included.

<i>Premise 1</i>	<i>Premise 2</i>	<i>Conclusion</i>	<i>Models</i>	<i>Countermodels</i>
All A are B	All B are C	All A are C	2^{2n}	0
All B are A	All C are B	All C are A	2^{2n}	0
All A are B	No B are C	No A are C	2^{2n}	0
All A are B	No B are C	No C are A	2^{2n}	0
All A are B	No C are B	No A are C	2^{2n}	0
All A are B	No C are B	No C are A	2^{2n}	0
No A are B	All C are B	No A are C	2^{2n}	0
No A are B	All C are B	No C are A	2^{2n}	0
No B are A	All C are B	No A are C	2^{2n}	0
No B are A	All C are B	No C are A	2^{2n}	0
All B are A	Some B are C	Some A are C	$6^n - 5^n$	0
All B are A	Some B are C	Some C are A	$6^n - 5^n$	0
All B are A	Some C are B	Some A are C	$6^n - 5^n$	0
All B are A	Some C are B	Some C are A	$6^n - 5^n$	0
All A are B	Some C are not B	Some C are not A	$6^n - 5^n$	0
All B are A	Some B are not C	Some A are not C	$6^n - 5^n$	0
Some A are B	All B are C	Some A are C	$6^n - 5^n$	0
Some A are B	All B are C	Some C are A	$6^n - 5^n$	0
Some B are A	All B are C	Some A are C	$6^n - 5^n$	0
Some B are A	All B are C	Some C are A	$6^n - 5^n$	0
Some A are B	No B are C	Some A are not C	$6^n - 5^n$	0
Some A are B	No C are B	Some A are not C	$6^n - 5^n$	0
Some B are A	No B are C	Some A are not C	$6^n - 5^n$	0
Some B are A	No C are B	Some A are not C	$6^n - 5^n$	0
No A are B	Some B are C	Some C are not A	$6^n - 5^n$	0
No A are B	Some C are B	Some C are not A	$6^n - 5^n$	0
No B are A	Some B are C	Some C are not A	$6^n - 5^n$	0
No B are A	Some C are B	Some C are not A	$6^n - 5^n$	0
Some A are not B	All C are B	Some A are not C	$6^n - 5^n$	0
Some B are not A	All B are C	Some C are not A	$6^n - 5^n$	0
All A are B	All B are C	Some C are not A	2^{2n}	2^n
All B are A	All C are B	Some A are not C	2^{2n}	2^n
All A are B	All B are C	Some A are C	2^{2n}	3^n
All A are B	All B are C	Some C are A	2^{2n}	3^n
All B are A	All C are B	Some A are C	2^{2n}	3^n
All B are A	All C are B	Some C are A	2^{2n}	3^n
All A are B	No B are C	Some A are not C	2^{2n}	3^n
All A are B	No B are C	Some C are not A	2^{2n}	3^n
All A are B	No C are B	Some A are not C	2^{2n}	3^n
All A are B	No C are B	Some C are not A	2^{2n}	3^n
No A are B	All C are B	Some A are not C	2^{2n}	3^n
No A are B	All C are B	Some C are not A	2^{2n}	3^n
No B are A	All C are B	Some A are not C	2^{2n}	3^n

(Continued on next page)

Table 5—continued from previous page

<i>Premise 1</i>	<i>Premise 2</i>	<i>Conclusion</i>	<i>Models</i>	<i>Countermodels</i>
No B are A	All C are B	Some C are not A	2^{2n}	3^n
All B are A	All B are C	Some A are C	5^n	3^n
All B are A	All B are C	Some C are A	5^n	3^n
All B are A	No B are C	Some A are not C	5^n	3^n
All B are A	No C are B	Some A are not C	5^n	3^n
No A are B	All B are C	Some C are not A	5^n	3^n
No B are A	All B are C	Some C are not A	5^n	3^n
All A are B	All B are C	No A are C	2^{2n}	$4^n - 3^n$
All A are B	All B are C	No C are A	2^{2n}	$4^n - 3^n$
All B are A	All C are B	No A are C	2^{2n}	$4^n - 3^n$
All B are A	All C are B	No C are A	2^{2n}	$4^n - 3^n$
All A are B	No B are C	All A are C	2^{2n}	$4^n - 3^n$
All A are B	No B are C	All C are A	2^{2n}	$4^n - 3^n$
All A are B	No C are B	All A are C	2^{2n}	$4^n - 3^n$
All A are B	No C are B	All C are A	2^{2n}	$4^n - 3^n$
No A are B	All C are B	All A are C	2^{2n}	$4^n - 3^n$
No A are B	All C are B	All C are A	2^{2n}	$4^n - 3^n$
No B are A	All C are B	All A are C	2^{2n}	$4^n - 3^n$
No B are A	All C are B	All C are A	2^{2n}	$4^n - 3^n$
All B are A	Some B are C	Some A are not C	$6^n - 5^n$	$4^n - 3^n$
All B are A	Some C are B	Some A are not C	$6^n - 5^n$	$4^n - 3^n$
All B are A	Some B are not C	Some A are C	$6^n - 5^n$	$4^n - 3^n$
All B are A	Some B are not C	Some C are A	$6^n - 5^n$	$4^n - 3^n$
Some A are B	All B are C	Some C are not A	$6^n - 5^n$	$4^n - 3^n$
Some B are A	All B are C	Some C are not A	$6^n - 5^n$	$4^n - 3^n$
No A are B	Some B are not C	Some C are not A	$6^n - 5^n$	$4^n - 3^n$
No B are A	Some B are not C	Some C are not A	$6^n - 5^n$	$4^n - 3^n$
Some B are not A	All B are C	Some A are C	$6^n - 5^n$	$4^n - 3^n$
Some B are not A	All B are C	Some C are A	$6^n - 5^n$	$4^n - 3^n$
Some B are not A	No B are C	Some A are not C	$6^n - 5^n$	$4^n - 3^n$
Some B are not A	No C are B	Some A are not C	$6^n - 5^n$	$4^n - 3^n$
All A are B	Some B are C	Some C are not A	$6^n - 4^n$	$4^n - 3^n$
All A are B	Some C are B	Some C are not A	$6^n - 4^n$	$4^n - 3^n$
All B are A	Some C are not B	Some A are C	$6^n - 4^n$	$4^n - 3^n$
All B are A	Some C are not B	Some C are A	$6^n - 4^n$	$4^n - 3^n$
Some A are B	All C are B	Some A are not C	$6^n - 4^n$	$4^n - 3^n$
Some B are A	All C are B	Some A are not C	$6^n - 4^n$	$4^n - 3^n$
No A are B	Some C are not B	Some C are not A	$6^n - 4^n$	$4^n - 3^n$
No B are A	Some C are not B	Some C are not A	$6^n - 4^n$	$4^n - 3^n$
Some A are not B	All B are C	Some A are C	$6^n - 4^n$	$4^n - 3^n$
Some A are not B	All B are C	Some C are A	$6^n - 4^n$	$4^n - 3^n$
Some A are not B	No B are C	Some A are not C	$6^n - 4^n$	$4^n - 3^n$
Some A are not B	No C are B	Some A are not C	$6^n - 4^n$	$4^n - 3^n$
All A are B	All B are C	All C are A	2^{2n}	$4^n - 2^n$
All B are A	All C are B	All A are C	2^{2n}	$4^n - 2^n$
All A are B	Some B are not C	Some C are not A	$6^n - 4^n$	$4^n - 2^n$
All B are A	Some C are not B	Some A are not C	$6^n - 4^n$	$4^n - 2^n$
Some A are not B	All B are C	Some C are not A	$6^n - 4^n$	$4^n - 2^n$
Some B are not A	All C are B	Some A are not C	$6^n - 4^n$	$4^n - 2^n$
All A are B	All B are C	Some A are not C	2^{2n}	4^n
All B are A	All C are B	Some C are not A	2^{2n}	4^n
All A are B	No B are C	Some A are C	2^{2n}	4^n
All A are B	No B are C	Some C are A	2^{2n}	4^n
All A are B	No C are B	Some A are C	2^{2n}	4^n
All A are B	No C are B	Some C are A	2^{2n}	4^n
No A are B	All C are B	Some A are C	2^{2n}	4^n
No A are B	All C are B	Some C are A	2^{2n}	4^n
No B are A	All C are B	Some A are C	2^{2n}	4^n
No B are A	All C are B	Some C are A	2^{2n}	4^n
All A are B	All C are B	Some A are C	5^n	4^n
All A are B	All C are B	Some C are A	5^n	4^n
All A are B	All C are B	Some A are not C	5^n	4^n

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Table 5—continued from previous page

<i>Premise 1</i>	<i>Premise 2</i>	<i>Conclusion</i>	<i>Models</i>	<i>Countermodels</i>
All A are B	All C are B	Some C are not A	5^n	4^n
All B are A	All B are C	Some A are not C	5^n	4^n
All B are A	All B are C	Some C are not A	5^n	4^n
All B are A	No B are C	Some A are C	5^n	4^n
All B are A	No B are C	Some C are A	5^n	4^n
All B are A	No B are C	Some C are not A	5^n	4^n
All B are A	No C are B	Some A are C	5^n	4^n
All B are A	No C are B	Some C are A	5^n	4^n
All B are A	No C are B	Some C are not A	5^n	4^n
No A are B	All B are C	Some A are C	5^n	4^n
No A are B	All B are C	Some C are A	5^n	4^n
No A are B	All B are C	Some A are not C	5^n	4^n
No B are A	All B are C	Some A are C	5^n	4^n
No B are A	All B are C	Some C are A	5^n	4^n
No B are A	All B are C	Some A are not C	5^n	4^n
No A are B	No B are C	Some A are C	5^n	4^n
No A are B	No B are C	Some C are A	5^n	4^n
No A are B	No B are C	Some A are not C	5^n	4^n
No A are B	No B are C	Some C are not A	5^n	4^n
No A are B	No C are B	Some A are C	5^n	4^n
No A are B	No C are B	Some C are A	5^n	4^n
No A are B	No C are B	Some A are not C	5^n	4^n
No A are B	No C are B	Some C are not A	5^n	4^n
No A are B	No C are B	Some A are C	5^n	4^n
No A are B	No C are B	Some C are A	5^n	4^n
No A are B	No C are B	Some A are not C	5^n	4^n
No A are B	No C are B	Some C are not A	5^n	4^n
All A are B	All C are B	All A are C	5^n	$5^n - 4^n$
All A are B	All C are B	All C are A	5^n	$5^n - 4^n$
All A are B	All C are B	No A are C	5^n	$5^n - 4^n$
All A are B	All C are B	No C are A	5^n	$5^n - 4^n$
All B are A	All B are C	All A are C	5^n	$5^n - 4^n$
All B are A	All B are C	All C are A	5^n	$5^n - 4^n$
All B are A	No B are C	All C are A	5^n	$5^n - 4^n$
All B are A	No B are C	No A are C	5^n	$5^n - 4^n$
All B are A	No B are C	No C are A	5^n	$5^n - 4^n$
All B are A	No C are B	All C are A	5^n	$5^n - 4^n$
All B are A	No C are B	No A are C	5^n	$5^n - 4^n$
All B are A	No C are B	No C are A	5^n	$5^n - 4^n$
No A are B	All B are C	All A are C	5^n	$5^n - 4^n$
No A are B	All B are C	No A are C	5^n	$5^n - 4^n$
No A are B	All B are C	No C are A	5^n	$5^n - 4^n$
No B are A	All B are C	All A are C	5^n	$5^n - 4^n$
No B are A	All B are C	No A are C	5^n	$5^n - 4^n$
No B are A	All B are C	No C are A	5^n	$5^n - 4^n$
No A are B	No B are C	All A are C	5^n	$5^n - 4^n$
No A are B	No B are C	All C are A	5^n	$5^n - 4^n$
No A are B	No B are C	No A are C	5^n	$5^n - 4^n$
No A are B	No B are C	No C are A	5^n	$5^n - 4^n$
No A are B	No C are B	All A are C	5^n	$5^n - 4^n$
No A are B	No C are B	All C are A	5^n	$5^n - 4^n$
No A are B	No C are B	No A are C	5^n	$5^n - 4^n$
No A are B	No C are B	No C are A	5^n	$5^n - 4^n$
No B are A	No B are C	All A are C	5^n	$5^n - 4^n$
No B are A	No B are C	All C are A	5^n	$5^n - 4^n$
No B are A	No B are C	No A are C	5^n	$5^n - 4^n$
No B are A	No B are C	No C are A	5^n	$5^n - 4^n$
No B are A	No C are B	All A are C	5^n	$5^n - 4^n$

(Continued on next page)

Table 5—continued from previous page

<i>Premise 1</i>	<i>Premise 2</i>	<i>Conclusion</i>	<i>Models</i>	<i>Countermodels</i>
No B are A	No C are B	All C are A	5^n	$5^n - 4^n$
No B are A	No C are B	No A are C	5^n	$5^n - 4^n$
No B are A	No C are B	No C are A	5^n	$5^n - 4^n$
All B are A	Some B are C	Some C are not A	$6^n - 5^n$	$5^n - 4^n$
All B are A	Some C are B	Some C are not A	$6^n - 5^n$	$5^n - 4^n$
All A are B	Some C are not B	Some A are C	$6^n - 5^n$	$5^n - 4^n$
All A are B	Some C are not B	Some C are A	$6^n - 5^n$	$5^n - 4^n$
All A are B	Some C are not B	Some A are not C	$6^n - 5^n$	$5^n - 4^n$
All B are A	Some B are not C	Some C are not A	$6^n - 5^n$	$5^n - 4^n$
Some A are B	All B are C	Some A are not C	$6^n - 5^n$	$5^n - 4^n$
Some B are A	All B are C	Some A are not C	$6^n - 5^n$	$5^n - 4^n$
Some A are B	No B are C	Some A are C	$6^n - 5^n$	$5^n - 4^n$
Some A are B	No B are C	Some C are A	$6^n - 5^n$	$5^n - 4^n$
Some A are B	No B are C	Some C are not A	$6^n - 5^n$	$5^n - 4^n$
Some A are B	No C are B	Some A are C	$6^n - 5^n$	$5^n - 4^n$
Some A are B	No C are B	Some C are A	$6^n - 5^n$	$5^n - 4^n$
Some A are B	No C are B	Some C are not A	$6^n - 5^n$	$5^n - 4^n$
Some B are A	No B are C	Some A are C	$6^n - 5^n$	$5^n - 4^n$
Some B are A	No B are C	Some C are A	$6^n - 5^n$	$5^n - 4^n$
Some B are A	No B are C	Some C are not A	$6^n - 5^n$	$5^n - 4^n$
Some B are A	No C are B	Some A are C	$6^n - 5^n$	$5^n - 4^n$
Some B are A	No C are B	Some C are A	$6^n - 5^n$	$5^n - 4^n$
Some B are A	No C are B	Some C are not A	$6^n - 5^n$	$5^n - 4^n$
No A are B	Some B are C	Some A are C	$6^n - 5^n$	$5^n - 4^n$
No A are B	Some B are C	Some C are A	$6^n - 5^n$	$5^n - 4^n$
No A are B	Some B are C	Some A are not C	$6^n - 5^n$	$5^n - 4^n$
No A are B	Some C are B	Some A are C	$6^n - 5^n$	$5^n - 4^n$
No A are B	Some C are B	Some C are A	$6^n - 5^n$	$5^n - 4^n$
No A are B	Some C are B	Some A are not C	$6^n - 5^n$	$5^n - 4^n$
No B are A	Some B are C	Some A are C	$6^n - 5^n$	$5^n - 4^n$
No B are A	Some B are C	Some C are A	$6^n - 5^n$	$5^n - 4^n$
No B are A	Some B are C	Some A are not C	$6^n - 5^n$	$5^n - 4^n$
No B are A	Some C are B	Some A are C	$6^n - 5^n$	$5^n - 4^n$
No B are A	Some C are B	Some C are A	$6^n - 5^n$	$5^n - 4^n$
No B are A	Some C are B	Some A are not C	$6^n - 5^n$	$5^n - 4^n$
No A are B	Some B are not C	Some A are C	$6^n - 5^n$	$5^n - 4^n$
No A are B	Some B are not C	Some C are A	$6^n - 5^n$	$5^n - 4^n$
No A are B	Some B are not C	Some A are not C	$6^n - 5^n$	$5^n - 4^n$
No B are A	Some B are not C	Some A are C	$6^n - 5^n$	$5^n - 4^n$
No B are A	Some B are not C	Some C are A	$6^n - 5^n$	$5^n - 4^n$
No B are A	Some B are not C	Some A are not C	$6^n - 5^n$	$5^n - 4^n$
Some A are not B	All C are B	Some A are C	$6^n - 5^n$	$5^n - 4^n$
Some A are not B	All C are B	Some C are A	$6^n - 5^n$	$5^n - 4^n$
Some A are not B	All C are B	Some C are not A	$6^n - 5^n$	$5^n - 4^n$
Some B are not A	All B are C	Some A are not C	$6^n - 5^n$	$5^n - 4^n$
Some B are not A	No B are C	Some A are C	$6^n - 5^n$	$5^n - 4^n$
Some B are not A	No B are C	Some C are A	$6^n - 5^n$	$5^n - 4^n$
Some B are not A	No B are C	Some C are not A	$6^n - 5^n$	$5^n - 4^n$
Some B are not A	No C are B	Some A are C	$6^n - 5^n$	$5^n - 4^n$
Some B are not A	No C are B	Some C are A	$6^n - 5^n$	$5^n - 4^n$
Some B are not A	No C are B	Some C are not A	$6^n - 5^n$	$5^n - 4^n$
All A are B	Some B are C	Some A are C	$6^n - 4^n$	$5^n - 4^n$
All A are B	Some B are C	Some C are A	$6^n - 4^n$	$5^n - 4^n$
All A are B	Some C are B	Some A are C	$6^n - 4^n$	$5^n - 4^n$
All A are B	Some C are B	Some C are A	$6^n - 4^n$	$5^n - 4^n$
All A are B	Some B are not C	Some A are not C	$6^n - 4^n$	$5^n - 4^n$
All B are A	Some C are not B	Some C are not A	$6^n - 4^n$	$5^n - 4^n$
Some A are B	All C are B	Some A are C	$6^n - 4^n$	$5^n - 4^n$
Some A are B	All C are B	Some C are A	$6^n - 4^n$	$5^n - 4^n$
Some B are A	All C are B	Some A are C	$6^n - 4^n$	$5^n - 4^n$
Some B are A	All C are B	Some C are A	$6^n - 4^n$	$5^n - 4^n$
No A are B	Some C are not B	Some A are C	$6^n - 4^n$	$5^n - 4^n$

(Continued on next page)

Table 5—continued from previous page

<i>Premise 1</i>	<i>Premise 2</i>	<i>Conclusion</i>	<i>Models</i>	<i>Countermodels</i>
No A are B	Some C are not B	Some C are A	$6^n - 4^n$	$5^n - 4^n$
No B are A	Some C are not B	Some A are C	$6^n - 4^n$	$5^n - 4^n$
No B are A	Some C are not B	Some C are A	$6^n - 4^n$	$5^n - 4^n$
Some A are not B	All B are C	Some A are not C	$6^n - 4^n$	$5^n - 4^n$
Some B are not A	All C are B	Some C are not A	$6^n - 4^n$	$5^n - 4^n$
Some A are not B	No B are C	Some A are C	$6^n - 4^n$	$5^n - 4^n$
Some A are not B	No B are C	Some C are A	$6^n - 4^n$	$5^n - 4^n$
Some A are not B	No C are B	Some A are C	$6^n - 4^n$	$5^n - 4^n$
Some A are not B	No C are B	Some C are A	$6^n - 4^n$	$5^n - 4^n$
All B are A	Some B are C	All C are A	$6^n - 5^n$	$4^n + 6^n - 2 \cdot 5^n$
All B are A	Some C are B	All C are A	$6^n - 5^n$	$4^n + 6^n - 2 \cdot 5^n$
All A are B	Some C are not B	All A are C	$6^n - 5^n$	$4^n + 6^n - 2 \cdot 5^n$
All A are B	Some C are not B	No A are C	$6^n - 5^n$	$4^n + 6^n - 2 \cdot 5^n$
All A are B	Some C are not B	No C are A	$6^n - 5^n$	$4^n + 6^n - 2 \cdot 5^n$
All B are A	Some B are not C	All C are A	$6^n - 5^n$	$4^n + 6^n - 2 \cdot 5^n$
Some A are B	All B are C	All A are C	$6^n - 5^n$	$4^n + 6^n - 2 \cdot 5^n$
Some B are A	All B are C	All A are C	$6^n - 5^n$	$4^n + 6^n - 2 \cdot 5^n$
Some A are B	No B are C	All C are A	$6^n - 5^n$	$4^n + 6^n - 2 \cdot 5^n$
Some A are B	No B are C	No A are C	$6^n - 5^n$	$4^n + 6^n - 2 \cdot 5^n$
Some A are B	No B are C	No C are A	$6^n - 5^n$	$4^n + 6^n - 2 \cdot 5^n$
Some A are B	No C are B	All C are A	$6^n - 5^n$	$4^n + 6^n - 2 \cdot 5^n$
Some A are B	No C are B	No A are C	$6^n - 5^n$	$4^n + 6^n - 2 \cdot 5^n$
Some A are B	No C are B	No C are A	$6^n - 5^n$	$4^n + 6^n - 2 \cdot 5^n$
Some B are A	No B are C	All C are A	$6^n - 5^n$	$4^n + 6^n - 2 \cdot 5^n$
Some B are A	No B are C	No A are C	$6^n - 5^n$	$4^n + 6^n - 2 \cdot 5^n$
Some B are A	No B are C	No C are A	$6^n - 5^n$	$4^n + 6^n - 2 \cdot 5^n$
Some B are A	No C are B	All C are A	$6^n - 5^n$	$4^n + 6^n - 2 \cdot 5^n$
Some B are A	No C are B	No A are C	$6^n - 5^n$	$4^n + 6^n - 2 \cdot 5^n$
Some B are A	No C are B	No C are A	$6^n - 5^n$	$4^n + 6^n - 2 \cdot 5^n$
No A are B	Some B are C	All A are C	$6^n - 5^n$	$4^n + 6^n - 2 \cdot 5^n$
No A are B	Some B are C	No A are C	$6^n - 5^n$	$4^n + 6^n - 2 \cdot 5^n$
No A are B	Some B are C	No C are A	$6^n - 5^n$	$4^n + 6^n - 2 \cdot 5^n$
No A are B	Some C are B	All A are C	$6^n - 5^n$	$4^n + 6^n - 2 \cdot 5^n$
No A are B	Some C are B	No A are C	$6^n - 5^n$	$4^n + 6^n - 2 \cdot 5^n$
No A are B	Some C are B	No C are A	$6^n - 5^n$	$4^n + 6^n - 2 \cdot 5^n$
No B are A	Some B are C	All A are C	$6^n - 5^n$	$4^n + 6^n - 2 \cdot 5^n$
No B are A	Some B are C	No A are C	$6^n - 5^n$	$4^n + 6^n - 2 \cdot 5^n$
No B are A	Some B are C	No C are A	$6^n - 5^n$	$4^n + 6^n - 2 \cdot 5^n$
No B are A	Some C are B	All A are C	$6^n - 5^n$	$4^n + 6^n - 2 \cdot 5^n$
No B are A	Some C are B	No A are C	$6^n - 5^n$	$4^n + 6^n - 2 \cdot 5^n$
No B are A	Some C are B	No C are A	$6^n - 5^n$	$4^n + 6^n - 2 \cdot 5^n$
No A are B	Some B are not C	All A are C	$6^n - 5^n$	$4^n + 6^n - 2 \cdot 5^n$
No A are B	Some B are not C	No A are C	$6^n - 5^n$	$4^n + 6^n - 2 \cdot 5^n$
No A are B	Some B are not C	No C are A	$6^n - 5^n$	$4^n + 6^n - 2 \cdot 5^n$
No B are A	Some B are not C	All A are C	$6^n - 5^n$	$4^n + 6^n - 2 \cdot 5^n$
No B are A	Some B are not C	No A are C	$6^n - 5^n$	$4^n + 6^n - 2 \cdot 5^n$
No B are A	Some B are not C	No C are A	$6^n - 5^n$	$4^n + 6^n - 2 \cdot 5^n$
Some A are not B	All C are B	All C are A	$6^n - 5^n$	$4^n + 6^n - 2 \cdot 5^n$
Some A are not B	All C are B	No A are C	$6^n - 5^n$	$4^n + 6^n - 2 \cdot 5^n$
Some A are not B	All C are B	No C are A	$6^n - 5^n$	$4^n + 6^n - 2 \cdot 5^n$
Some B are not A	All B are C	All A are C	$6^n - 5^n$	$4^n + 6^n - 2 \cdot 5^n$
Some B are not A	No B are C	All C are A	$6^n - 5^n$	$4^n + 6^n - 2 \cdot 5^n$
Some B are not A	No B are C	No A are C	$6^n - 5^n$	$4^n + 6^n - 2 \cdot 5^n$
Some B are not A	No B are C	No C are A	$6^n - 5^n$	$4^n + 6^n - 2 \cdot 5^n$
Some B are not A	No C are B	All C are A	$6^n - 5^n$	$4^n + 6^n - 2 \cdot 5^n$
Some B are not A	No C are B	No A are C	$6^n - 5^n$	$4^n + 6^n - 2 \cdot 5^n$
Some B are not A	No C are B	No C are A	$6^n - 5^n$	$4^n + 6^n - 2 \cdot 5^n$
Some A are B	Some C are not B	Some A are C	$8^n - 2 \cdot 6^n + 4^n$	$4^n + 6^n - 2 \cdot 5^n$
Some A are B	Some C are not B	Some C are A	$8^n - 2 \cdot 6^n + 4^n$	$4^n + 6^n - 2 \cdot 5^n$
Some B are A	Some C are not B	Some A are C	$8^n - 2 \cdot 6^n + 4^n$	$4^n + 6^n - 2 \cdot 5^n$
Some B are A	Some C are not B	Some C are A	$8^n - 2 \cdot 6^n + 4^n$	$4^n + 6^n - 2 \cdot 5^n$
Some A are not B	Some B are C	Some A are C	$8^n - 2 \cdot 6^n + 4^n$	$4^n + 6^n - 2 \cdot 5^n$

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Table 5—continued from previous page

<i>Premise 1</i>	<i>Premise 2</i>	<i>Conclusion</i>	<i>Models</i>	<i>Countermodels</i>
Some A are not B	Some B are C	Some C are A	$8^n - 2 \cdot 6^n + 4^n$	$4^n + 6^n - 2 \cdot 5^n$
Some A are not B	Some C are B	Some A are C	$8^n - 2 \cdot 6^n + 4^n$	$4^n + 6^n - 2 \cdot 5^n$
Some A are not B	Some C are B	Some C are A	$8^n - 2 \cdot 6^n + 4^n$	$4^n + 6^n - 2 \cdot 5^n$
Some A are not B	Some B are not C	Some A are not C	$8^n - 2 \cdot 6^n + 4^n$	$4^n + 6^n - 2 \cdot 5^n$
Some B are not A	Some C are not B	Some C are not A	$8^n - 2 \cdot 6^n + 4^n$	$4^n + 6^n - 2 \cdot 5^n$
Some A are B	Some B are C	Some A are C	$8^n - 2 \cdot 6^n + 5^n$	$4^n + 6^n - 2 \cdot 5^n$
Some A are B	Some B are C	Some C are A	$8^n - 2 \cdot 6^n + 5^n$	$4^n + 6^n - 2 \cdot 5^n$
Some A are B	Some C are B	Some A are C	$8^n - 2 \cdot 6^n + 5^n$	$4^n + 6^n - 2 \cdot 5^n$
Some A are B	Some C are B	Some C are A	$8^n - 2 \cdot 6^n + 5^n$	$4^n + 6^n - 2 \cdot 5^n$
Some A are B	Some C are B	Some C are A	$8^n - 2 \cdot 6^n + 5^n$	$4^n + 6^n - 2 \cdot 5^n$
Some B are A	Some B are C	Some A are C	$8^n - 2 \cdot 6^n + 5^n$	$4^n + 6^n - 2 \cdot 5^n$
Some B are A	Some B are C	Some C are A	$8^n - 2 \cdot 6^n + 5^n$	$4^n + 6^n - 2 \cdot 5^n$
Some B are A	Some C are B	Some A are C	$8^n - 2 \cdot 6^n + 5^n$	$4^n + 6^n - 2 \cdot 5^n$
Some B are A	Some C are B	Some C are A	$8^n - 2 \cdot 6^n + 5^n$	$4^n + 6^n - 2 \cdot 5^n$
Some A are B	Some B are not C	Some A are not C	$8^n - 2 \cdot 6^n + 5^n$	$4^n + 6^n - 2 \cdot 5^n$
Some B are A	Some B are not C	Some A are not C	$8^n - 2 \cdot 6^n + 5^n$	$4^n + 6^n - 2 \cdot 5^n$
Some B are not A	Some B are C	Some C are not A	$8^n - 2 \cdot 6^n + 5^n$	$4^n + 6^n - 2 \cdot 5^n$
Some B are not A	Some C are B	Some C are not A	$8^n - 2 \cdot 6^n + 5^n$	$4^n + 6^n - 2 \cdot 5^n$
Some A are not B	Some C are not B	Some A are C	$8^n - 2 \cdot 6^n + 5^n$	$4^n + 6^n - 2 \cdot 5^n$
Some A are not B	Some C are not B	Some C are A	$8^n - 2 \cdot 6^n + 5^n$	$4^n + 6^n - 2 \cdot 5^n$
All B are A	All B are C	No A are C	5^n	$5^n - 3^n$
All B are A	All B are C	No C are A	5^n	$5^n - 3^n$
All B are A	No B are C	All A are C	5^n	$5^n - 3^n$
All B are A	No C are B	All A are C	5^n	$5^n - 3^n$
No A are B	All B are C	All C are A	5^n	$5^n - 3^n$
No B are A	All B are C	All C are A	5^n	$5^n - 3^n$
All A are B	Some B are C	Some A are not C	$6^n - 4^n$	$5^n - 3^n$
All A are B	Some C are B	Some A are not C	$6^n - 4^n$	$5^n - 3^n$
All A are B	Some B are not C	Some A are C	$6^n - 4^n$	$5^n - 3^n$
All A are B	Some B are not C	Some C are A	$6^n - 4^n$	$5^n - 3^n$
Some A are B	All C are B	Some C are not A	$6^n - 4^n$	$5^n - 3^n$
Some B are A	All C are B	Some C are not A	$6^n - 4^n$	$5^n - 3^n$
No A are B	Some C are not B	Some A are not C	$6^n - 4^n$	$5^n - 3^n$
No B are A	Some C are not B	Some A are not C	$6^n - 4^n$	$5^n - 3^n$
Some B are not A	All C are B	Some A are C	$6^n - 4^n$	$5^n - 3^n$
Some B are not A	All C are B	Some C are A	$6^n - 4^n$	$5^n - 3^n$
Some A are not B	No B are C	Some C are not A	$6^n - 4^n$	$5^n - 3^n$
Some A are not B	No C are B	Some C are not A	$6^n - 4^n$	$5^n - 3^n$
All B are A	Some B are C	All A are C	$6^n - 5^n$	$3^n + 6^n - 4^n - 5^n$
All B are A	Some C are B	All A are C	$6^n - 5^n$	$3^n + 6^n - 4^n - 5^n$
All B are A	Some B are not C	No A are C	$6^n - 5^n$	$3^n + 6^n - 4^n - 5^n$
All B are A	Some B are not C	No C are A	$6^n - 5^n$	$3^n + 6^n - 4^n - 5^n$
Some A are B	All B are C	All C are A	$6^n - 5^n$	$3^n + 6^n - 4^n - 5^n$
Some B are A	All B are C	All C are A	$6^n - 5^n$	$3^n + 6^n - 4^n - 5^n$
No A are B	Some B are not C	All C are A	$6^n - 5^n$	$3^n + 6^n - 4^n - 5^n$
No B are A	Some B are not C	All C are A	$6^n - 5^n$	$3^n + 6^n - 4^n - 5^n$
Some B are not A	All B are C	No A are C	$6^n - 5^n$	$3^n + 6^n - 4^n - 5^n$
Some B are not A	All B are C	No C are A	$6^n - 5^n$	$3^n + 6^n - 4^n - 5^n$
Some B are not A	No B are C	All A are C	$6^n - 5^n$	$3^n + 6^n - 4^n - 5^n$
Some B are not A	No C are B	All A are C	$6^n - 5^n$	$3^n + 6^n - 4^n - 5^n$
All A are B	Some B are C	All A are C	$6^n - 4^n$	$3^n + 6^n - 4^n - 5^n$
All A are B	Some C are B	All A are C	$6^n - 4^n$	$3^n + 6^n - 4^n - 5^n$
All A are B	Some B are not C	No A are C	$6^n - 4^n$	$3^n + 6^n - 4^n - 5^n$
All A are B	Some B are not C	No C are A	$6^n - 4^n$	$3^n + 6^n - 4^n - 5^n$
Some A are B	All C are B	All C are A	$6^n - 4^n$	$3^n + 6^n - 4^n - 5^n$
Some B are A	All C are B	All C are A	$6^n - 4^n$	$3^n + 6^n - 4^n - 5^n$
No A are B	Some C are not B	All A are C	$6^n - 4^n$	$3^n + 6^n - 4^n - 5^n$
No B are A	Some C are not B	All A are C	$6^n - 4^n$	$3^n + 6^n - 4^n - 5^n$
Some B are not A	All C are B	No A are C	$6^n - 4^n$	$3^n + 6^n - 4^n - 5^n$
Some B are not A	All C are B	No C are A	$6^n - 4^n$	$3^n + 6^n - 4^n - 5^n$
Some A are not B	No B are C	All C are A	$6^n - 4^n$	$3^n + 6^n - 4^n - 5^n$
Some A are not B	No C are B	All C are A	$6^n - 4^n$	$3^n + 6^n - 4^n - 5^n$
Some A are B	Some C are not B	Some A are not C	$8^n - 2 \cdot 6^n + 4^n$	$3^n + 6^n - 4^n - 5^n$

(Continued on next page)

Table 5—continued from previous page

<i>Premise 1</i>	<i>Premise 2</i>	<i>Conclusion</i>	<i>Models</i>	<i>Countermodels</i>
Some A are B	Some C are not B	Some C are not A	$8^n - 2 \cdot 6^n + 4^n$	$3^n + 6^n - 4^n - 5^n$
Some B are A	Some C are not B	Some A are not C	$8^n - 2 \cdot 6^n + 4^n$	$3^n + 6^n - 4^n - 5^n$
Some B are A	Some C are not B	Some C are not A	$8^n - 2 \cdot 6^n + 4^n$	$3^n + 6^n - 4^n - 5^n$
Some A are not B	Some B are C	Some A are not C	$8^n - 2 \cdot 6^n + 4^n$	$3^n + 6^n - 4^n - 5^n$
Some A are not B	Some B are C	Some C are not A	$8^n - 2 \cdot 6^n + 4^n$	$3^n + 6^n - 4^n - 5^n$
Some A are not B	Some C are B	Some A are not C	$8^n - 2 \cdot 6^n + 4^n$	$3^n + 6^n - 4^n - 5^n$
Some A are not B	Some C are B	Some C are not A	$8^n - 2 \cdot 6^n + 4^n$	$3^n + 6^n - 4^n - 5^n$
Some A are not B	Some B are not C	Some A are C	$8^n - 2 \cdot 6^n + 4^n$	$3^n + 6^n - 4^n - 5^n$
Some A are not B	Some B are not C	Some C are A	$8^n - 2 \cdot 6^n + 4^n$	$3^n + 6^n - 4^n - 5^n$
Some B are not A	Some C are not B	Some A are C	$8^n - 2 \cdot 6^n + 4^n$	$3^n + 6^n - 4^n - 5^n$
Some B are not A	Some C are not B	Some C are A	$8^n - 2 \cdot 6^n + 4^n$	$3^n + 6^n - 4^n - 5^n$
All B are A	Some B are C	No A are C	$6^n - 5^n$	$6^n - 5^n$
All B are A	Some B are C	No C are A	$6^n - 5^n$	$6^n - 5^n$
All B are A	Some C are B	No A are C	$6^n - 5^n$	$6^n - 5^n$
All B are A	Some C are B	No C are A	$6^n - 5^n$	$6^n - 5^n$
All A are B	Some C are not B	All C are A	$6^n - 5^n$	$6^n - 5^n$
All B are A	Some B are not C	All A are C	$6^n - 5^n$	$6^n - 5^n$
Some A are B	All B are C	No A are C	$6^n - 5^n$	$6^n - 5^n$
Some A are B	All B are C	No C are A	$6^n - 5^n$	$6^n - 5^n$
Some B are A	All B are C	No A are C	$6^n - 5^n$	$6^n - 5^n$
Some B are A	All B are C	No C are A	$6^n - 5^n$	$6^n - 5^n$
Some A are B	No B are C	All A are C	$6^n - 5^n$	$6^n - 5^n$
Some A are B	No C are B	All A are C	$6^n - 5^n$	$6^n - 5^n$
Some B are A	No B are C	All A are C	$6^n - 5^n$	$6^n - 5^n$
Some B are A	No C are B	All A are C	$6^n - 5^n$	$6^n - 5^n$
No A are B	Some B are C	All C are A	$6^n - 5^n$	$6^n - 5^n$
No A are B	Some C are B	All C are A	$6^n - 5^n$	$6^n - 5^n$
No B are A	Some B are C	All C are A	$6^n - 5^n$	$6^n - 5^n$
No B are A	Some C are B	All C are A	$6^n - 5^n$	$6^n - 5^n$
Some A are not B	All C are B	All A are C	$6^n - 5^n$	$6^n - 5^n$
Some B are not A	All B are C	All C are A	$6^n - 5^n$	$6^n - 5^n$
All A are B	Some B are C	No A are C	$6^n - 4^n$	$6^n - 5^n$
All A are B	Some B are C	No C are A	$6^n - 4^n$	$6^n - 5^n$
All A are B	Some C are B	No A are C	$6^n - 4^n$	$6^n - 5^n$
All A are B	Some C are B	No C are A	$6^n - 4^n$	$6^n - 5^n$
All A are B	Some B are not C	All A are C	$6^n - 4^n$	$6^n - 5^n$
All B are A	Some C are not B	All C are A	$6^n - 4^n$	$6^n - 5^n$
Some A are B	All C are B	No A are C	$6^n - 4^n$	$6^n - 5^n$
Some A are B	All C are B	No C are A	$6^n - 4^n$	$6^n - 5^n$
Some B are A	All C are B	No A are C	$6^n - 4^n$	$6^n - 5^n$
Some B are A	All C are B	No C are A	$6^n - 4^n$	$6^n - 5^n$
No A are B	Some C are not B	No A are C	$6^n - 4^n$	$6^n - 5^n$
No A are B	Some C are not B	No C are A	$6^n - 4^n$	$6^n - 5^n$
No B are A	Some C are not B	No A are C	$6^n - 4^n$	$6^n - 5^n$
No B are A	Some C are not B	No C are A	$6^n - 4^n$	$6^n - 5^n$
Some A are not B	All B are C	All A are C	$6^n - 4^n$	$6^n - 5^n$
Some B are not A	All C are B	All C are A	$6^n - 4^n$	$6^n - 5^n$
Some A are not B	No B are C	No A are C	$6^n - 4^n$	$6^n - 5^n$
Some A are not B	No B are C	No C are A	$6^n - 4^n$	$6^n - 5^n$
Some A are not B	No C are B	No A are C	$6^n - 4^n$	$6^n - 5^n$
Some A are not B	No C are B	No C are A	$6^n - 4^n$	$6^n - 5^n$
Some A are B	Some B are C	Some A are not C	$8^n - 2 \cdot 6^n + 5^n$	$6^n - 5^n$
Some A are B	Some B are C	Some C are not A	$8^n - 2 \cdot 6^n + 5^n$	$6^n - 5^n$
Some A are B	Some C are B	Some A are not C	$8^n - 2 \cdot 6^n + 5^n$	$6^n - 5^n$
Some A are B	Some C are B	Some C are not A	$8^n - 2 \cdot 6^n + 5^n$	$6^n - 5^n$
Some B are A	Some B are C	Some A are not C	$8^n - 2 \cdot 6^n + 5^n$	$6^n - 5^n$
Some B are A	Some B are C	Some C are not A	$8^n - 2 \cdot 6^n + 5^n$	$6^n - 5^n$
Some B are A	Some C are B	Some A are not C	$8^n - 2 \cdot 6^n + 5^n$	$6^n - 5^n$
Some B are A	Some C are B	Some C are not A	$8^n - 2 \cdot 6^n + 5^n$	$6^n - 5^n$
Some A are B	Some B are not C	Some A are C	$8^n - 2 \cdot 6^n + 5^n$	$6^n - 5^n$
Some A are B	Some B are not C	Some C are A	$8^n - 2 \cdot 6^n + 5^n$	$6^n - 5^n$
Some B are A	Some B are not C	Some A are C	$8^n - 2 \cdot 6^n + 5^n$	$6^n - 5^n$

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Table 5—continued from previous page

<i>Premise 1</i>	<i>Premise 2</i>	<i>Conclusion</i>	<i>Models</i>	<i>Countermodels</i>
Some B are not A	Some C are not B	All C are A	$8^n - 2 \cdot 6^n + 4^n$	$8^n - 3 \cdot 6^n + 2 \cdot 5^n$
Some A are B	Some B are C	All A are C	$8^n - 2 \cdot 6^n + 5^n$	$8^n - 3 \cdot 6^n + 2 \cdot 5^n$
Some A are B	Some B are C	All C are A	$8^n - 2 \cdot 6^n + 5^n$	$8^n - 3 \cdot 6^n + 2 \cdot 5^n$
Some A are B	Some C are B	All A are C	$8^n - 2 \cdot 6^n + 5^n$	$8^n - 3 \cdot 6^n + 2 \cdot 5^n$
Some A are B	Some C are B	All C are A	$8^n - 2 \cdot 6^n + 5^n$	$8^n - 3 \cdot 6^n + 2 \cdot 5^n$
Some B are A	Some B are C	All A are C	$8^n - 2 \cdot 6^n + 5^n$	$8^n - 3 \cdot 6^n + 2 \cdot 5^n$
Some B are A	Some B are C	All C are A	$8^n - 2 \cdot 6^n + 5^n$	$8^n - 3 \cdot 6^n + 2 \cdot 5^n$
Some B are A	Some C are B	All A are C	$8^n - 2 \cdot 6^n + 5^n$	$8^n - 3 \cdot 6^n + 2 \cdot 5^n$
Some B are A	Some C are B	All C are A	$8^n - 2 \cdot 6^n + 5^n$	$8^n - 3 \cdot 6^n + 2 \cdot 5^n$
Some A are B	Some B are not C	No A are C	$8^n - 2 \cdot 6^n + 5^n$	$8^n - 3 \cdot 6^n + 2 \cdot 5^n$
Some A are B	Some B are not C	No C are A	$8^n - 2 \cdot 6^n + 5^n$	$8^n - 3 \cdot 6^n + 2 \cdot 5^n$
Some B are A	Some B are not C	No A are C	$8^n - 2 \cdot 6^n + 5^n$	$8^n - 3 \cdot 6^n + 2 \cdot 5^n$
Some B are A	Some B are not C	No C are A	$8^n - 2 \cdot 6^n + 5^n$	$8^n - 3 \cdot 6^n + 2 \cdot 5^n$
Some B are not A	Some B are C	No A are C	$8^n - 2 \cdot 6^n + 5^n$	$8^n - 3 \cdot 6^n + 2 \cdot 5^n$
Some B are not A	Some B are C	No C are A	$8^n - 2 \cdot 6^n + 5^n$	$8^n - 3 \cdot 6^n + 2 \cdot 5^n$
Some B are not A	Some C are B	No A are C	$8^n - 2 \cdot 6^n + 5^n$	$8^n - 3 \cdot 6^n + 2 \cdot 5^n$
Some B are not A	Some C are B	No C are A	$8^n - 2 \cdot 6^n + 5^n$	$8^n - 3 \cdot 6^n + 2 \cdot 5^n$
Some A are not B	Some C are not B	All A are C	$8^n - 2 \cdot 6^n + 5^n$	$8^n - 3 \cdot 6^n + 2 \cdot 5^n$
Some A are not B	Some C are not B	All C are A	$8^n - 2 \cdot 6^n + 5^n$	$8^n - 3 \cdot 6^n + 2 \cdot 5^n$
Some B are not A	Some B are not C	All A are C	$8^n - 2 \cdot 6^n + 5^n$	$8^n - 3 \cdot 6^n + 2 \cdot 5^n$
Some B are not A	Some B are not C	All C are A	$8^n - 2 \cdot 6^n + 5^n$	$8^n - 3 \cdot 6^n + 2 \cdot 5^n$
Some A are B	Some B are C	No A are C	$8^n - 2 \cdot 6^n + 5^n$	$8^n - 3 \cdot 6^n + 3 \cdot 5^n - 4^n$
Some A are B	Some B are C	No C are A	$8^n - 2 \cdot 6^n + 5^n$	$8^n - 3 \cdot 6^n + 3 \cdot 5^n - 4^n$
Some A are B	Some C are B	No A are C	$8^n - 2 \cdot 6^n + 5^n$	$8^n - 3 \cdot 6^n + 3 \cdot 5^n - 4^n$
Some A are B	Some C are B	No C are A	$8^n - 2 \cdot 6^n + 5^n$	$8^n - 3 \cdot 6^n + 3 \cdot 5^n - 4^n$
Some B are A	Some B are C	No A are C	$8^n - 2 \cdot 6^n + 5^n$	$8^n - 3 \cdot 6^n + 3 \cdot 5^n - 4^n$
Some B are A	Some B are C	No C are A	$8^n - 2 \cdot 6^n + 5^n$	$8^n - 3 \cdot 6^n + 3 \cdot 5^n - 4^n$
Some B are A	Some C are B	No A are C	$8^n - 2 \cdot 6^n + 5^n$	$8^n - 3 \cdot 6^n + 3 \cdot 5^n - 4^n$
Some B are A	Some C are B	No C are A	$8^n - 2 \cdot 6^n + 5^n$	$8^n - 3 \cdot 6^n + 3 \cdot 5^n - 4^n$
Some A are B	Some B are not C	All A are C	$8^n - 2 \cdot 6^n + 5^n$	$8^n - 3 \cdot 6^n + 3 \cdot 5^n - 4^n$
Some B are A	Some B are not C	All A are C	$8^n - 2 \cdot 6^n + 5^n$	$8^n - 3 \cdot 6^n + 3 \cdot 5^n - 4^n$
Some B are not A	Some B are C	All C are A	$8^n - 2 \cdot 6^n + 5^n$	$8^n - 3 \cdot 6^n + 3 \cdot 5^n - 4^n$
Some B are not A	Some C are B	All C are A	$8^n - 2 \cdot 6^n + 5^n$	$8^n - 3 \cdot 6^n + 3 \cdot 5^n - 4^n$
Some A are not B	Some C are not B	No A are C	$8^n - 2 \cdot 6^n + 5^n$	$8^n - 3 \cdot 6^n + 3 \cdot 5^n - 4^n$
Some A are not B	Some C are not B	No C are A	$8^n - 2 \cdot 6^n + 5^n$	$8^n - 3 \cdot 6^n + 3 \cdot 5^n - 4^n$