

Logic—Sample Test D2

NAME \_\_\_\_\_

Translate the following sentences into the language of quantifier logic using the given abbreviations. Remember that you do not need to worry about tense.

$Bx = x$  is a boy

$Gx = x$  is a girl

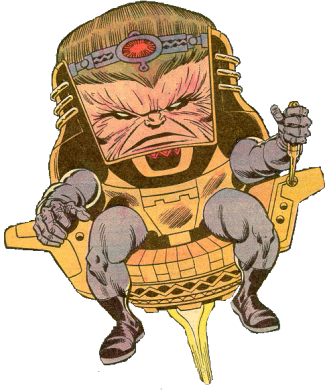
$Dxy = x$  is dancing with  $y$

$k =$  Keith

$j =$  Julie

1. “No boy is going to dance with Julie.”
2. “Every boy except possibly Keith is going to dance with Julie.”
3. “Unless Julie dances with a girl, Keith will not dance with any boys.”
4. “Every boy and girl is dancing with someone of the opposite sex.”
5. “Keith is dancing with some girl other than Julie.”
6. “Every girl is dancing with a boy except perhaps for Julie.”

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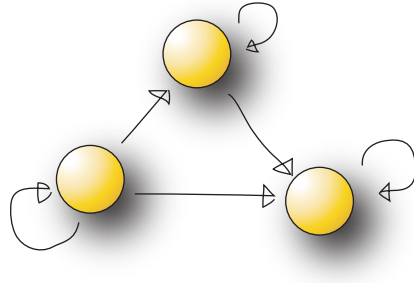


$Px = x$  is a person  
 $Hx = x$  is a hero  
 $Gx = x$  is green  
 $Cxy = x$  can see  $y$   
 $Sxy = x$  succumbs to the will of  $y$   
 $s =$  Princess Shadow  
 $h =$  The Incredible Hulk  
 $m =$  Modok

7. "The Incredible Hulk can be seen, and he's green."
8. "Princess Shadow is invisible."
9. "If Princess Shadow can see Modok, she will succumb to his will."
10. "Princess Shadow isn't the only hero who succumbs to Modok's will."
11. "Every hero can see some other hero."
12. "No more than two heroes are green."
13. "At least two heroes succumb to Modok's will."
14. "Every hero succumbs to the will of something."
15. "The only heroes who possibly avoid succumbing to the will of Modok, are those that are green."

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16. The relation  $Q$ , where  $Q$  is defined over the universe pictured below.  
Reflexive? ( Reflexive / Irreflexive / Neither )  
Symmetric? ( Symmetric / Anti-symmetric / Neither )  
Transitive? ( Transitive / Intransitive / Neither )



17. What is the definition of an equivalence relation?

A relation is an equivalence relation if it is reflexive, symmetric, and transitive.

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Use the truth tree method to determine whether the arguments are valid. Number all lines. Label all derived lines with the rule and the line from which they were derived. Cross out discharged sentences.

18.    $\sim\forall x(Kx \supset Mx)$   
       $\forall x\forall y((Kx \ \& \ Ky) \supset x=y)$   
       $M_j$   
       $\sim\exists xKx$
-

Logic—Sample Test D2

Use the truth tree method to determine whether the set of sentences is consistent. Number all lines. Label all derived lines with the rule and the line from which they were derived.

19.  $\{ \exists x(Ax \ \& \ Bx), \ \forall x(Bx \supset Cx), \ \forall x(Ax \supset Cx), \ \forall y \sim \exists x(Cyx \ \& \ Cxy) \}$

$$20. \frac{\sim \forall x(Px \supset \exists yFxy)}{\exists x(Px \ \& \ \forall y \sim Fxy)}$$

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21.  $\{ \exists x(Px \ \& \ a \neq x), \exists z \sim Pz, \forall xy((Px \ \& \ x=a) \supset Qxy), \forall x \sim Qxx \}$