

Logic—Sample Test D4

NAME \_\_\_\_\_

1. Define 'counterexample'. (10 points)

2. Define 'valid'. (20 points)

Translate the following sentences into the language of quantifier logic using the given abbreviations. Remember that you do not need to worry about tense. (2 points each.)

$Lx = x$  is a location

$Px = x$  is a person

$Rx = x$  is rich

$Bx = x$  is beautiful

$\forall xy = x$  visits  $y$

$j =$  Janine

$k =$  Kathryn

$f =$  France

3. "Janine and Kathryn are beautiful."

4. "Janine will only visit France if she's rich."

5. "Janine doesn't visit anyone."

6. "Kathryn is visiting some beautiful place."

7. "No one rich is visiting France."

8. "Everybody who is beautiful visits Janine."

Logic—Sample Test D4

9. “Not everyone who visits Kathryn is beautiful.”
10. “Kathryn doesn’t have anyone visiting her.”
11. “Not every place is beautiful.”
12. “Janine is not visiting anyone rich.”
13. “Everyone who isn’t visiting Janine is visiting France instead.”
14. “If Kathryn is visiting France, she isn’t visiting Janine.”
15. “The only people who ever visit France are the rich.”
16. “It’s not only *beautiful* people whom Janine visits.”
17. “Someone rich is visiting everywhere.”
18. “Someone is visiting somewhere beautiful.”
19. “Kathryn is visiting one of Janine’s visitors.”
20. “Anybody visiting Kathryn, is visiting someone beautiful.”
21. “No one who is beautiful will visit someone who isn’t either rich or beautiful.”

Logic—Sample Test D4

Use the truth tree method to determine whether the pair of sentences is equivalent. Number all lines. Label all derived lines with the rule and the line from which they were derived. Cross out discharged sentences. (8 points)

22. {  $\sim\exists x(Px \ \& \ \exists y(Py \ \& \ Lxy))$ ,  $\forall x\forall y((Px \ \& \ Py) \supset \sim Lxy)$  }

Logic—Sample Test D4

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. Cross out discharged sentences. (8 points)

23. {  $P \supset \sim \exists z(Rz \ \& \ \forall wJzw)$ ,  $\sim(\sim P \vee Q)$ ,  $\exists y \forall x(Jyx \ \& \ Rx)$  }

Logic—Sample Test D4

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. (8 points each)

24.  $Fc \ \& \ \forall xy((Rxy \ \& \ Fx) \supset Gy)$   
 $\forall x\exists yRxy$   
 $\sim Gb$   
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 $\exists x(Rcx \ \& \ \sim(x=b))$

Logic—Sample Test D4

25.  $\forall x((Hx \ \& \ Bxf) \supset I)$

$\forall x(Yx \supset Bxf)$

$\exists x(Hx \ \& \ Yx)$

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