

Logic—Sample Test C2

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.)

$Px = x$ is a person.

$Hx = x$ is happy.

$Bx = x$ barks.

$Sx = x$ is shaggy.

$Dx = x$ is a dog.

$c =$ Chris

$d =$ Duke

3. "Chris and Duke are happy."

4. "Someone isn't happy."

5. "Duke is a non-barking dog."

6. "All shaggy dogs bark."

7. "No one who is shaggy is happy."

8. "There is a dog who is happy, but Chris certainly isn't."

9. "Duke is barking, and someone is not happy."

10. "Unless Chris is a dog, he isn't shaggy."

11. "If a dog is barking, it isn't happy."

12. "Not all shaggy dogs are happy."

13. "Nobody is shaggy, but Duke, the dog, is."

Logic—Sample Test C2

14. “Some dog is shaggy, but nevertheless happy.”
15. “Chris is not a happy dog.”
16. “Some barking dog is not happy.”
17. “A dog is happy only if it is not barking.”
18. “Not all dogs are shaggy or happy.”
19. “If Chris is not happy, nobody is happy.”
20. “If any dog is shaggy, everybody is happy.”

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 each)

21. $\{ \exists xPx \ \& \ \exists z\sim Pz, \ \forall x\forall z((Px \ \& \ \sim Pz) \supset Lxz), \ \forall y\sim Lyy \}$

Logic—Sample Test C2

22. { $\forall x(Hx \supset (Bx \ \& \ Sx)), \exists xHx, \exists xSx$ }

Logic—Sample Test C2

23. { $\exists x(Ax \ \& \ Bx) \supset \forall y(Cy \vee Dy)$, $\sim \forall x(\sim Ax \vee \sim Bx)$, $\sim \exists xCx$, $\exists xDx$ }

Logic—Sample Test C2

Use the truth tree method to determine whether the following argument is valid. List a separate translation before doing the tree. Number all lines. Label all derived lines with the rule and the line from which they were derived. Use the notation provided for your translations. (10 points)

$Dx = x$ is a dog.

$Bx = x$ is big

$Mx = x$ is mean

24. All dogs are big and mean.
Some dogs are mean.