

Logic—Sample Test C3

NAME _____

1. Define ‘counterexample’. (10 points)

A counterexample is a possible situation where all the premises are true and the conclusion is false.

2. Define ‘valid’. (20 points)

An argument is valid if and only if it has no counterexamples.

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

$Lx = x$ lounges.

$Px = x$ is a person.

$Tx = x$ is thirsty.

$e =$ Emelda

$k =$ Kelly

$d =$ Dave

3. “Kelly is not thirsty.”

4. “If Emelda isn’t thirsty, no one is.”

5. “No one is thirsty.”

6. “Someone who isn’t thirsty is lounging.”

7. “Kelly and Emelda are not both thirsty.”

8. “Dave will only lounge if he’s not thirsty.”

9. “Everyone who isn’t thirsty is lounging.”

10. “No one who is thirsty will lounge.”

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11. “Everybody racing is thirsty.”

12. “If Dave is thirsty, no one will be racing.”

13. “If someone thirsty is racing, he or she will not be lounging.”

14. “Only a person who is racing, will be thirsty.”

Use the truth tree method to determine whether the following sets of sentences are (self) consistent. Number all lines. Label all derived lines with the rule and the line from which they were derived. (8 points each)

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. (8 points each)

15. $\forall x((Dx \ \& \ Bx) \supset \sim Lx)$
 $Dp \ \& \ \sim Lp$

 $\exists x Bx$

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16. $\forall x((Kx \supset (Ax \ \& \ Bx))$
 \underline{Kc}
 $\exists x(Ax \ \& \ Bx)$

17. For each of the following sentences in the left hand column of the table below, indicate whether it is consistent with the statement P = “No one is perfect.” Also indicate whether the sentence is entailed by P. (2 points each)

	Consistent with P? (Y/N)	Entailed by P? (Y/N)
“Not everyone is perfect.”		
“Someone is perfect.”		
“Someone is imperfect.”		
“Not everyone is imperfect.”		
“Everyone is imperfect.”		

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Use the truth tree method to determine whether the sentences are consistent. Number all lines. Label all derived lines with the rule and the line from which they were derived. (8 points)

18. $\{ \exists x(Ax \ \& \ Bx) \supset \forall y(Cy \vee \sim Dy), \sim \forall x(\sim Ax \vee \sim Bx), \sim \exists x Cx, \exists x Dx \}$