

Logic—Sample Test B2

NAME _____

Translate the following sentences into the language of sentential logic using the abbreviations given to you. (These problems are worth 2 points each.)

D = “Morgan enjoys dancing.”

T = “Morgan will go out tonight.”

Y = “Morgan went out yesterday.”

C = “Christine will see Morgan at the club tonight.”

H = “Morgan has a hangover.”

J = “Jules has a good cure.”

1. “Morgan will go out tonight only if she enjoys dancing.”
2. “Morgan has a hangover if she went out yesterday.”
3. “Unless Morgan doesn’t enjoy dancing, she will go out tonight.”
4. “Morgan is going out if and only if she did not go out yesterday.”
5. “If Morgan went out yesterday and has a hangover, then Christine will not see Morgan at the club tonight.”
6. “If Morgan has a hangover, then if Jules has a good cure, Christine will see Morgan at the club tonight.”
7. “Morgan won’t go out tonight if Jules doesn’t have a good cure.”
8. “It’s untrue that Morgan either went out yesterday or is going out tonight.”
9. “Jules doesn’t have a good cure; unless Morgan doesn’t have a hangover, Christine is not going to see her at the club tonight.”
10. “If Christine sees Morgan at the club tonight, then either Morgan didn’t go out last night or she did go out but doesn’t have a hangover.”

Logic—Sample Test B2

11. Determine whether the following statements are true. If true, explain why (with a proof if possible); if false, find a counterexample:

- a. If a statement α implies the conjunction of statements β and γ , then α implies β and α implies γ .
- b. If a statement α implies the disjunction of statements β and γ , then α implies β or α implies γ .

12. Suppose we add the symbol '@' to our logic and we define its truth table as

α	β	$(\alpha @ \beta)$
T	T	F
F	T	T
T	F	T
F	F	F

What should the truth tree rule be for a statement of the form $(\alpha @ \beta)$?

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. Answers should look just as in the notes. Label the set as consistent or inconsistent.

13. $\{ \sim(\sim G \vee \sim L), (\sim P \supset X) \& \sim L, \sim\sim Y \vee \sim(R \& W) \}$

Logic—Sample Test B2

14. $\{ \sim(S \vee \sim Q), \sim R \supset S, T, R \vee Q \}$

Logic—Sample Test B2

Use the truth tree method to determine whether the argument is valid. Number all lines. Label all derived lines with the rule and the line from which they were derived. Answers should look just as in the notes. Label the argument as valid or invalid.

15. $E \ \& \ \sim(I \vee D)$
 $\sim E \vee (I \ \& \ D)$
 $\hline E \ \& \ \sim D$

$$\begin{array}{l} 16. \quad \sim(U \& (O \& N)) \\ \quad (O \supset N) \& (N \supset O) \\ \hline \quad U \vee (\sim U \& (O \& N)) \end{array}$$

Logic—Sample Test B2

17. Using the given atomic sentences, translate the argument below into the language of propositional logic. Use the truth tree method to determine whether the argument is valid. Number all lines. Label all derived lines with the rule and the line from which they were derived. Complete the truth tree. Answers should look just as in the notes.

H = "Damion went home."

F = "Damion finished Damion's assignment."

C = "Damion copied his friend's paper."

K = "Damion knows the material."

Damion either went home and finished his assignment, or he did neither.

If Damion went home, then he either copied his friend's paper or didn't finish his assignment.

It isn't the case that if Damion copied his friend's paper, the material is unknown to Damion.

Thus, Damion finished his assignment and knows the material.