

Math 160A - Winter 2002 - Quiz #1 ANSWERS

Instructor: Sam Buss - UCSD - January 25, 2002

1. Prove or disprove each of the following. (A, B, C are sentence symbols.)

a. $A \wedge B \rightarrow C \models A \rightarrow C$.

Answer: This is false. $v(A) = T, v(B) = F, v(C) = F$ is a counterexample.

b. $A \rightarrow C \models A \wedge B \rightarrow C$.

Answer: This is true. Use a truth table or reduced truth table.

c. $A \vee B \rightarrow C \models \neg(A \rightarrow C) \vee (B \rightarrow C)$.

Answer: This is false. $v(A) = T, v(B) = F, v(C) = F$ is one counterexample.

d. $A \rightarrow B \rightarrow A \models \neg B \rightarrow A \rightarrow B$.

Answer: This is true. Use a (reduced) truth table. Alternately, note that both formulas are tautologies.

2. True or False?

___ a. If $\Sigma \models \alpha \vee \beta$, then $\Sigma \models \alpha$ or $\Sigma \models \beta$. *Answer: False*

___ b. If $\Sigma \models \alpha$ or $\Sigma \models \beta$, then $\Sigma \models \alpha \vee \beta$. *Answer: True*

___ c. If $\Sigma \models \alpha \wedge \beta$, then $\Sigma \models \alpha$ and $\Sigma \models \beta$. *Answer: True*

___ d. If $\Sigma \models \alpha$ and $\Sigma \models \beta$, then $\Sigma \models \alpha \wedge \beta$. *Answer: True*

___ e. If Σ is satisfiable, then $\Sigma \models \alpha$. *Answer: False*

___ f. If Σ is not satisfiable, then $\Sigma \models \alpha$. *Answer: True*