

TEST 1
MATH 310

NAME: _____

September 16, 2015

Each question is worth 10 points. Good luck!

1.

a) Let A and B be sets. Define $A \cup B$.

b) Define contradiction.

2. Use truth tables to show the following statements are equivalent:

$$\sim (P \rightarrow Q) \text{ and } P \wedge \sim Q$$

3.

a) Identify the antecedent (hypothesis) and the consequent (conclusion) for the following conditional sentence.

“A sequence a being bounded is necessary for a sequence a to be convergent.”

b) Write the converse and contrapositive for the conditional sentence in part a).

4.

a) Translate the following symbolic sentence into English.

$$\forall x \in \mathbb{N}, x \text{ is odd} \rightarrow x^2 \text{ is odd.}$$

b) For the statement in part a), write a useful denial, and give a translation into ordinary English.

5.

a) If $\sim (P \wedge Q)$ is false, what must be the truth value of Q ?

b) If $Q \rightarrow (P \wedge \sim P)$ is true, what must be the truth value of Q ?

6. Give an example of nonempty sets A and B such that $A^C \cap B^C \neq (A \cap B)^C$.