

Math 300 In-Class Worksheet 4: Negating Statements

1) Write a truth table for the logical statements:

(i) $P \vee (Q \Rightarrow R)$

(ii) $(P \wedge \neg P) \Rightarrow Q$

(iii) $\neg(P \Rightarrow Q)$

2) Negate the following:

(a) If you score greater than 90%, then you have done great in this course.

(b) If it rains, then I won't walk my dog.

(c) If $x^2 + 2x + 1 = 0$, then $x = -1$.

(d) $x^2 + x - 2 = 0$ implies $x = 1$ or $x = -2$.

3) (# 1, Section 2.2) Write the converse and contrapositive of each of the following conditional statements.

- (a) If $a = 5$, then $a^2 = 25$.
- (b) If it is not raining, then Laura is playing golf.
- (c) If $a \neq b$, then $a^4 \neq b^4$.
- (d) If a is an odd integer, then $3a$ is an odd integer.

4) (From Raymond Smullyan) On the Isle of Glas, we have knights, knaves, and spies. Knights always tell the truth, knaves always lie, and spies can either lie or tell the truth. While visiting the Isle, you encounter three individuals: Able, Berthhold, and Caan, one of which is a spy, one of which is a knight, and one of which is a knave. Able says that Caan is a knave. Berthhold says that Able is a knight. Caan says "I am the spy." Which one is the spy, which one is the knight, and which one is the knave?