

# Homework 2

Math 220 (section 906), Fall 2018

This homework is due on Thursday, September 6. You may cite results from class, as appropriate.

1. Use a truth table to determine whether the following implications are true or false.
  - (a)  $P \Rightarrow (P \wedge Q)$
  - (b)  $(P \wedge Q) \Rightarrow Q$
  - (c)  $(P \wedge Q) \Rightarrow (P \vee Q)$
  - (d)  $\neg(P \wedge Q) \Rightarrow (P \vee (\neg Q))$
2. (a) Rewrite the following quantified statement using “ $\forall$ ” or “ $\exists$ ”: *The implication  $(P \Rightarrow Q) \Rightarrow (Q \Rightarrow P)$  is true for every statement  $P$  and every statement  $Q$ .*  
(b) Is your answer to (a) a true statement? Explain.
3. Determine whether each statement is true or false. Explain your answer.
  - (a) For every real number  $x$ , the equality  $x^2 - 6x + 9 = 0$  holds if and only if  $x = 3$ .
  - (b) For every real number  $x$ , the equality  $x^2 - 2x - 3 = 0$  holds if and only if  $x = 3$ .
  - (c) For every real number  $x$ , the equality  $x^2 + 3 = 0$  holds if and only if  $x = 3$ .
  - (d) For every real number  $x$ , if the equality  $x^2 + 3 = 0$  holds, then  $x = 3$ .
4. Section 1.1 #2e, 3ac, 5hi, 7ab, 11, 13, 16