

Section 1.1

20 pts

2. Which of these are propositions? What are the truth values of those that are propositions? (3 pt)

- a) Do not pass go.
- b) What time is it?
- c) There are no black flies in Maine.
- d) $4 + x = 5$.
- e) The moon is made of green cheese.
- f) $2n \geq 100$.

4. What is the negation of each of these propositions? (2 pt)

- a) Jennifer and Teja are friends.
- b) There are 13 items in a baker's dozen.
- c) Abby sent more than 100 text messages every day.
- d) 121 is a perfect square.

8. Let p and q be the propositions. (4 pt)

p : I bought a lottery ticket this week.

q : I won the million dollar jackpot.

Express each of these propositions as an English sentence.

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|--------------------------|--------------------------------|---------------------------|-------------------------------|
| a) $\neg p$ | b) $p \vee q$ | c) $p \rightarrow q$ | d) $p \wedge q$ |
| e) $p \leftrightarrow q$ | f) $\neg p \rightarrow \neg q$ | g) $\neg p \wedge \neg q$ | h) $\neg p \vee (p \wedge q)$ |

16. Determine whether these biconditionals are true or false. (2 pt)

- a) $2 + 2 = 4$ if and only if $1 + 1 = 2$.
- b) $1 + 1 = 2$ if and only if $2 + 3 = 4$.
- c) $1 + 1 = 3$ if and only if monkeys can fly.
- d) $0 > 1$ if and only if $2 > 1$.

22. Write each of these statements in the form "if p , then q " in English. [Hint: Refer to the list of common ways to express conditional statements provided in this section.] (3 pt)

- a) It is necessary to wash the boss's car to get promoted.
- b) Winds from the south imply a spring thaw.
- c) A sufficient condition for the warranty to be good is that you bought the computer less than a year ago.
- d) Willy gets caught whenever he cheats.
- e) You can access the website only if you pay a subscription fee.
- f) Getting elected follows from knowing the right people.
- g) Carol gets seasick whenever she is on a boat.

28. State the converse, contrapositive, and inverse of each of these conditional statements. (3 pt)

- a) If it snows tonight, then I will stay at home.
- b) I go to the beach whenever it is a sunny summer day.
- c) When I stay up late, it is necessary that I sleep until noon.

32. Construct a truth table for each of these compound propositions. (3 pt)

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|---|--|
| a) $p \rightarrow \neg p$ | b) $p \leftrightarrow \neg p$ |
| c) $p \oplus (p \vee q)$ | d) $(p \wedge q) \rightarrow (p \vee q)$ |
| e) $(q \rightarrow \neg p) \leftrightarrow (p \leftrightarrow q)$ | f) $(p \leftrightarrow q) \oplus (p \leftrightarrow \neg q)$ |