

## 1.1 Propositional Logic

### 1.1 pg. 13 # 13

Let  $p$  and  $q$  be the propositions

- $p$ : You drive over 65 miles per hour.
- $q$ : You get a speeding ticket.

Write these propositions using  $p$  and  $q$  and logical connectives (including negations).

- b) You drive over 65 miles per hour, but you do not get a speeding ticket.
- c) You will get a speeding ticket if you drive over 65 miles per hour.
- f) You get a speeding ticket, but you do not drive over 65 miles per hour.
- g) Whenever you get a speeding ticket, you are driving over 65 miles per hour.

### 1.1 pg. 14 # 23

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.]

- a) It snows whenever the wind blows from the northeast.
- b) The apple trees will bloom if it stays warm for a week.
- c) That the Pistons win the championship implies that they beat the Lakers.
- d) It is necessary to walk 8 miles to get to the top of Long’s Peak.

### 1.1 pg. 14 # 25

Write each of these propositions in the form “ $p$  if and only if  $q$ ” in English.

- a) If it is hot outside you buy an ice cream cone, and if you buy an ice cream cone, it is hot outside.
- b) For you to win the contest it is necessary and sufficient that you have the only winning ticket.
- c) You get promoted only if you have connections, and you have connections only if you get promoted.
- d) If you watch television your mind will decay, and conversely.

**1.1 pg. 15 # 33**

Construct a truth table for each of these compound propositions

a)  $(p \vee q) \rightarrow (p \oplus q)$

c)  $(p \vee q) \oplus (p \wedge q)$

d)  $(p \leftrightarrow q) \oplus (\neg p \leftrightarrow q)$

**1.1 pg. 15 # 37**

Construct a truth table for each of these compound propositions

a)  $p \rightarrow (\neg q \vee r)$

b)  $\neg p \rightarrow (q \rightarrow r)$

d)  $(p \rightarrow q) \wedge (\neg p \rightarrow r)$

f)  $(\neg p \leftrightarrow \neg q) \leftrightarrow (q \leftrightarrow r)$

**1.1 pg. 16 # 43**

Find the bitwise OR, bitwise AND, and bitwise XOR of each of these pairs of bit strings.

a) 101 1110, 010 0001

b) 1111 0000, 1010 1010

c) 00 0111 0001, 10 0100 1000

d) 11 1111 1111, 000 0000 0000