Discrete Mathematics and Proof Unit 1 practice: And and or: conjunction and disjunction

Name _____ Date _____ Period _____

1. Decide whether each statement is true or false.

(a) 22 > 12 and 22 is even

(b) 38 is odd or 38 > 47

(c) 18 is a multiple of 9 and 18 is odd

(d) 36 is a perfect square or 36 < 10

(e) 15 + 21 = 36 and 15 < 21

(f) 6 × 11 = 68 or 6 > 11

2. Take P to be true, Q true and R false. Is each statement true or false?

(a) $P \vee R$

(b) $Q \wedge \neg R$

(c) $\neg P \vee \neg Q$

(d) $(P \vee R) \wedge Q$

(e) $\neg P \wedge (Q \vee R)$

(f) $(P \wedge \neg Q) \vee (Q \wedge \neg R)$

3. (a) How many integers x make "$x > -5$ and $x \leq 7$ and x is odd" true?

(b) Find every real number x for which "$x^2 = 9$ and $x < 0$" is true.

(c) Find every real number x for which "$x^2 = 16$ or $2x = 18$" is true.

(d) Write the column of $\neg(P \vee Q)$, top to bottom, in the usual row order.

4. (a) A coffee shop gives free refills on every date of the month that is a multiple of 3 or a multiple of 7. How many dates of a 30-day month get free refills?

(b) A museum lets a visitor in free when the visitor is under 6 or at least 64 years old. Of the whole-number ages from 1 to 90, how many get in free?

(c) Isaac's school numbers its lockers 1 to 36, and Isaac may pick any locker whose number is even and greater than 18. How many lockers can Isaac pick from?

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