COT 3100: Exam #1 Review Questions

1) Prove or disprove the following statement over the universe of all real numbers for x and y:
$\exists x \forall y [y^2 - 6y + x \geq 0]$.

2) Prove or disprove the following assertion for finite sets A, B and C:

$$A \times (B \cap C) = (A \times B) \cap (A \times C)$$

3) Use the laws of implication to prove the conclusion shown from the following premises:

$(p \vee q) \rightarrow (t)$
$s \rightarrow (r \vee p)$
$u \rightarrow (\bar{r} \vee q)$
$v \rightarrow (s \wedge u)$
v
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t

4) Prove or disprove the assertion below for finite sets A and B. (Note: $\wp(A)$ denotes the power set of A.)

$$\wp(A) \cup \wp(B) = \wp(A \cup B)$$

5) Find all ordered pairs of integers (x, y) such that $131x + 58y = 4$.

6) Prove or disprove: Let a, b, c and d be arbitrary positive integers. If a | b and c | d, then ab | (c+d).

7) Let $n = 2^3 3^5 7^2$ and $m = 2^2 3^7 5^3$. Find gcd(n, m) and lcm(n, m) in prime factorized form.

8) Using Fermat's Theorem, determine the remainder when 17^{122} is divided by 61.