Spring 2017 COT 3100 Section 2 Quiz #1

Name: _____

Lab Section: 17 18 19 20 21 22 24

1) (2 pts) Prove or disprove the following statement over the universe of real numbers for both x and y:

$$\forall y \exists x [x + y = 0]$$

2) (8 pts) Show that the following logical expression with Boolean variables *p*, *q* and *r* is a tautology (is equivalent to true) using the laws of logic. Please number your steps, write each expression after the number, followed by the reason(s) used.

$$\big(p \wedge (p \vee q)\big) \vee [q \vee \big((\bar{q} \vee r) \wedge (\bar{q} \vee \bar{r})\big)]$$

3) (5 pts) Let A = {1, 2, 3} and B = {2, 4}. List the elements of each of the following sets:

$A - B$ = { }

$A \times B$ = { }

$\wp(B)$ = { }

4) (10 pts) Without the aid of a Set Table, prove the following assertion about all finite sets A, B, C and D:

$$(A \cap B) \times (C \cap D) \subseteq (A \times C) \cap (A \times D) \cap (B \times C) \cap (B \times D)$$