Due Monday, Feb. 13 at start of class Name: _____

Discrete Math – Take Home Quiz 1

This quiz should take you approximately 25 minutes. You may use reference material, but are not allowed to ask for help from anyone except Dr. Clair.

(10) 1. Show that $(q \vee s) \wedge (r \vee p) \wedge (\neg s \vee \neg p) \wedge (s \vee \neg q)$ is satisfiable.

(10) 2. Suppose x and y are integers. True or false:

(a) _____ $\forall x(x^2 \geq x)$

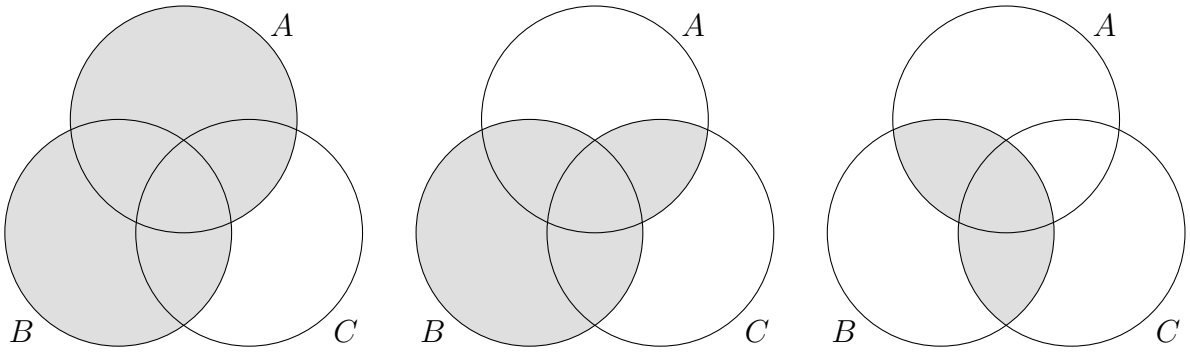
(b) _____ $\exists x(x^2 \leq x)$

(c) _____ $\exists! x(x^2 = 9)$

(d) _____ $\forall x(x^2 > 0 \rightarrow x > 0)$

(e) _____ $\forall x \exists y(x = y^2)$

(10) 3. In the Venn diagrams below, A, B, and C are the three circular regions.
Describe each shaded set in terms of A, B, C and basic set operations.



(10) 4. Suppose a, b, c are positive real numbers.
Prove that if $abc > 1000$ then one of a, b, or c is larger than 10.

(10) 5. Suppose $x, y \in \mathbb{Z}$ with $x^2 = 1 + 13y^2$. Show that exactly one of x and y must be odd.
Extra credit: Find an example of x and y.