Loyola University Chicago
Math 201, Spring 2010

Worksheet 1

In the "True or False" questions below, provide a proof if the answer is "True" or provide a counterexample if the answer is "False".

1. True or False: $\forall\, x \in \mathbb{R}\ \exists\, y \in \mathbb{R}\ x - y^2 = 1$

2. True or False: $3 \in \{x \in \mathbb{R}\,;\, x^2 + 8 \leq 6x\} \cap \{y \in \mathbb{Z}\,;\, y^4 \leq 128\}$.

3. True or False: P AND $Q \iff [(P \text{ AND } (\text{NOT } P)) \implies (P \implies (\text{NOT } Q))]$

4. True or False: For every integer x and y, xy is divisible by 4 if and only if x is even and y is even.

5. Express each of the statements below as a logical expression using quantifiers.

There is a smallest positive integer.

There is no smallest positive real number.