Math 108—Homework 03

Due: Tuesday February 14 ♡

Name ______________________________

Directions: please print this page, and put your solutions in the space provided.

1. Prove by contraposition: Let $a \in \mathbb{Z}$. If a^2 is not divisible by 4, then a is odd.

2. Prove: if x and y are rational numbers, then $x + y$ and $x - y$ are also rational.
Remember the definition of rational: a number z is rational if there exists $a, b \in \mathbb{Z}$ such that $b \neq 0$ and $z = \frac{a}{b}$.

3. Prove by <u>contradiction</u>: If x is a rational number and y is an irrational number, then $x + y$ is irrational.
Hint: let $z = x + y$, and assume, towards a contradiction, that z is rational. Now consider using problem 2.

4. Prove by <u>contraposition</u>: Let x be a positive real number. If x is irrational, then $\sqrt{x}$ is also irrational.