1. Decide which of the following are statements:
   (a) Every positive real number $x$ has a square root.
   (b) $3 + n + n^2$.
   (c) $x^2 + x + 1 > 0$.

2. Identify the hypothesis and conclusion for the following statements:
   (a) If $XYZ$ is a right triangle, then it has no obtuse angles.
   (b) For every integer $n$, $1 + 2 + \cdots + n = n(n + 1)/2$.

   Prove directly (that is, don’t use contrapositive, etc.) on problems 3-6.

3. Prove: If $XYZ$ is an isosceles right triangle, then the hypotenuse is $\sqrt{2}$ times as long as one of its legs.

4. Prove: If $x$ and $y$ are nonnegative real numbers that satisfy $x + y = 0$, then $x = 0$ and $y = 0$.

5. Prove: If $x$ and $y$ are real numbers such that $x^2 + 6y^2 = 25$ and $y^2 + x = 3$, then $|y| = 2$.

6. Prove: If $p$ and $q$ are odd integers, then $p \cdot q$ is odd.

7. Write the negation of the following statements:
   (a) If $x < 0$, then $x^2 > 0$.
   (b) If $p$ and $q$ are odd integers, then $p \cdot q$ is odd.

8. Use proof by contraposition to prove: If $p$ and $q$ are odd integers, then $p \cdot q$ is odd.

9. Use proof by contraposition to prove: If $p$ and $q$ are integers such that $p \cdot q$ is even, then $p$ is even or $q$ is even.

10. Use proof by contradiction to prove: If $a > 0$, then $1/a > 0$.

11. Use proof by contradiction to prove: If $a$ is a rational number and $b$ is an irrational number, then $a + b$ is an irrational number.

12. Prove: If $x$ and $y$ are non-negative real numbers, then $x + y = 0$ if and only if $x = 0$ and $y = 0$. 