

## Exercises Involving Real Numbers #6

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**Instructions.** Statements 1-12 are false. For each statement, determine the conditions under which the statement is true. *Prove your claim.*

1.  $\sqrt{a+b} = \sqrt{a} + \sqrt{b}$

2.  $x \leq x^2$

3.  $xy \geq x + y$

4.  $\frac{1}{x} \leq x$

5.  $\frac{1}{x} + \frac{1}{y} \geq \frac{1}{x+y}$

6.  $\frac{2}{\frac{1}{x} + \frac{1}{y}} \leq \frac{x+y}{2}$

7.  $|x+y| = |x| + |y|$

8.  $\sqrt{xy} \leq \frac{(x+y)}{2}$

9.  $xy \leq x|y|$

10.  $\sqrt{x} \leq x$ , for all  $x \geq 0$ .

11. If  $x < y$ , then  $\frac{1}{x} > \frac{1}{y}$  ( $x, y \neq 0$ )

12. If  $x \leq y$ , then  $\frac{y}{x} \geq 1$  ( $x \neq 0$ )