Instructions. BE SURE TO WRITE YOUR NAME ON EACH PAGE TURNED IN. No programmable or graphical calculators. Show all working for full credit. The quiz will be graded out of 10 points (so there are 2 bonus points). Simplify your answers as much as possible. Time = 10 minutes.

1. Write the negation of the statement: $\forall x \in A, \exists y \in B$ s.t. $x < y < 1$. 

   Solution: The statement $x < y < 1$ is $(x < y) \land (y < 1)$, which has negation $(x \geq y) \lor (y \geq 1)$. Thus the answer is: $\exists x \in A$ s.t. $\forall y \in B, x \geq y$ or $y \geq 1$.

2. Consider the following statement about real numbers: $\exists x \text{ s.t. } \forall y$ and $\forall z, (z > y$ implies that $z > x + y)$. Is this statement true? If so, explain why. If not, explain why not. 

   Solution: Yes. For example let $x = 0$ (or let $x$ be any negative number). Then $\forall y$ and $\forall z, z > y$ clearly implies that $z > x + y$.

3. Prove that if $x$ is a rational number, and if $y$ is not a rational number, then $x + y$ is not a rational number.

   Solution: BWOC, suppose that $x$ is rational and $y$ is not rational, but $x + y$ is rational. Subtracting $x$ we see that $y = (x + y) - x$ is rational, being the difference of two rationals. This is a contradiction. Thus $x + y$ is not rational.