Name ______________________________________________________________________

Math 3283w Gateway Quiz 3 (4th Quiz overall): 25 minutes.
(Please note: there are three questions here on two pages.)

Your work will be graded on the quality of your writing as well as on the validity of the mathematics. Writing score: 5 points. The quiz is worth 20 points total. This quiz is closed books, closed notes, no phones or electronic devices allowed.

Do not use symbols for logical connectives and quantifiers. That is, do not use the symbols $\Rightarrow$, $\Leftrightarrow$, $\land$, $\lor$, $\neg$, $\forall$, and $\exists$.

1. (2 points) Please state the triangle inequality which holds in the real numbers. (You do not need to prove it.)

2. (5 points) Is the following statement true or false? Justify your answer with a proof or a counterexample:
   For all real numbers $x, y$, we have
   $$| |x| - |y| | \leq |x - y|.$$  
   (You may use the triangle inequality without proving it in any proof or counterexample you give for the above inequality.)
3. (8 points) The following property of real numbers was proved in your reading. Please produce a proof of this property here:

For all real numbers $x, y$, if $x < y$ then we can conclude that $-y < -x$.

**Important:** You may use in your proof the fact that $-z = (-1) \cdot z$ for any real number $z$ (and you need not prove this fact). Other than this, you should argue directly from the axioms of the real numbers as an ordered field in your proof.