Quiz 1, Discrete Math (15 points), Fall 2016

Show your work and justify your answers where appropriate. If you write the correct answer without sufficient work or justification, you will receive little or no credit.

1. (1 point each) Clearly circle your answer (no justification needed here, and no partial credit given).

   (a) If an implication is true, then its converse must also be true. YES NO

   (b) If 8 is a prime number, then $5^2 = 16$. TRUE FALSE

   (c) $2 + 2 = 5$ or $\sqrt{7}$ is rational. TRUE FALSE

2. (3 points) Write the negation of the following statement using quantifiers (do not use language like "it is not the case that..." or "there is no..."):

   "For every real number x, there is a real number y that satisfies $y > x$ and $y - x < 1$."

3. (3 points) Is it possible for "p or (not q)" and "(not p) and q" to *both* be false? Justify your answer.

4. (6 points) Prove that if x is a nonzero rational number and y is an irrational number, then xy is irrational.