HOMEWORK 8
DISCRETE MATHEMATICS I
DUE 02-12 (NOT 02-14)

Show your work!

(1) Explain, in your own words, the difference, if any, between the following pairs of statements. If there is no difference, then explain why not. If you like, you may choose a specific predicate $P(x, y)$.
   (a) $\forall x \exists y . P(x, y)$ and $\exists y \forall x . P(x, y)$.
   (b) $\forall x \forall y . P(x, y)$ and $\forall y \forall x . P(x, y)$.
   (c) $\exists x \exists y . P(x, y)$ and $\exists y \exists x . P(x, y)$.

(2) The following is the definition of the continuity of the function given by $f(x) = x^2$ at $x = 1$:

$$\forall \varepsilon > 0 \, \exists \delta > 0 \, \forall \text{real } x . \big(|x - 1| < \delta \to |x^2 - 1| < \varepsilon \big).$$

Write the *negation* of this definition.

- **Eight** book problems: #1.3.27, 28, 30, 31, 32, 41, 53, 54.