

Math 10850, Honors Calculus 1

Quiz 1, Thursday September 5

Name:

1. Let $p(x, y)$ be the predicate “ $x \cdot y = 1$ ”, where the universe of discourse for x is the natural numbers $\{1, 2, 3, \dots\}$, the universe of discourse for y is the real numbers, and “ \cdot ” is ordinary multiplication. Which of the following statements is true, and which is false? For each one, *briefly* explain your reasoning.

(a) $(\forall x)(\forall y)p(x, y)$.

(b) $(\forall x)(\exists y)p(x, y)$.

(c) $(\exists y)(\forall x)p(x, y)$.

2. We defined \Leftrightarrow in terms of \Rightarrow and \wedge , and we can express \Rightarrow as a combination of \vee and \neg . So:

(a) Write down an expression involving \wedge , \vee and \neg that is equivalent to $p \Leftrightarrow q$.

(b) Go further: write down an expression involving *only* \wedge and \neg that is equivalent to $p \Leftrightarrow q$.