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## CS 173 DISCUSSION 2: QUANTIFIERS AND PROOFS

Date: September 5/6, 2019.

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**Problem 1.** Negate the following statement, moving all negations (e.g. “not”) onto individual propositions.

For every Martian  $w$ , if  $w$  is green, then  $w$  is tall or  $w$  is ticklish.

Construct the contrapositive of the above statement.

**Problem 2.** For each claim, prove it using direct proof or disprove it using a concrete example.

1. For any integers  $p, q$ ,  $(p + q)^2 = p^2 + q^2$ .
2. For real numbers  $x, y$  with  $x \neq 0$ , if  $x$  and  $\frac{y+1}{3}$  are rational <sup>1</sup>, then  $\frac{1}{x} + y$  is rational.

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<sup>1</sup>A real number  $r$  is said to be *rational*, if there are integers  $p, q$  with  $q \neq 0$  such that  $r = p/q$ .