CMPSC 360 Discrete Mathematics for Computer Science
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Worksheet 5

1. Proof or disprove the following statements.
   (a) For $a, b \in \mathbb{R}$, if $a^2 = b^2$, then $a = b$.
   (b) $n^2 + n + 41$ is prime for $n \in \mathbb{Z}$.

2. Prove by contrapositive that if a number is divisible by 4, then its last two digits in base 10 is divisible by 4.

3. Suppose $q \in \mathbb{Z}$. Prove by contrapositive that if $6q + 7$ is even, then q is odd.

4. For $a, b, c \in \mathbb{R}^+$, prove that if $ab = c$, then $a \leqslant \sqrt{c}$ or $b \leqslant \sqrt{c}$.

5. Suppose $n \in \mathbb{Z}$ and $p \in \mathbb{P}$ (i.e., p is a prime number). Prove the statement: if $p \mid n$, then $p \nmid (n+1)$.