

Math 3520 - Quiz 5

Name: _____

Type proof in complete and proper English.

1. Show the sets have the same cardinality: $[0, 1)$ and $(2, 3]$
2. Prove the irrationals are uncountable.
3. Prove $8|n^2 - 1$ for every odd integer n .
4. Let $a, b, c, x, y \in \mathbb{Z}$. Show if $a|b$ and $a|c$ then $a|ax + by$.
5. Let $a, b, c \in \mathbb{Z}$ where $\gcd(a, b) = 1$. If $a|c$ and $b|c$ then $ab|c$.
6. Let $n \in \mathbb{Z}$ be odd. Prove $n^2 \equiv 1 \pmod{4}$.
7. For the following pairs of numbers, find their gcd and find a linear combination of the numbers equal to their gcd.
 - (a) $a = 78$ and $b = 48$
 - (b) $a = 79$ and $b = 49$
 - (c) $a = 253$ and $b = 207$