
This is not graded on correctness, merely the attempt. Please upload your solutions through the google form.

Number Theory Proofs

Exercise 1. *Prove the following theorem: Let a, b, and c be integers. If $a|b$, then $a|bc$.*

Exercise 2. *Prove the following theorem: Let a, b, c, d, and n be integers with n ¿ 0. If $a \equiv b \pmod{n}$ and $c \equiv d \pmod{n}$, then $a + b \equiv c + d \pmod{n}$.*

Hint: It isn't sufficient to say that you can add the equations together, think about what it means for values to be congruent in this manner.

Exercise 3. *Prove the following theorem: Let a, b, c, and n be integers with $n > 0$. If $a \equiv b \pmod{n}$ and $b \equiv c \pmod{n}$, the $a \equiv c \pmod{n}$*

Bonus

Exercise 4. *Prove the following theorem: A natural number n is prime if and only if for all primes $p \leq \sqrt{n}$, p does not divide n.*