Key Terms

- Well Ordering Axiom
  every nonempty subset of the set of positive integers contains smallest element
- Prime
  an integer is considered prime if the only divisors are ± 1 and $\pm$ itself
- Relatively Prime
  two integers whose GCD is 1

Theorems

Theorem. *Division Algorithm*
Let a,b be integers with $b > 0$. Then there $\exists q$ and $r \in \mathbb{Z}$ such that $a = bq + r$. where $0 \geq r < b$

Theorem. *Fundamental Theorem of Arithmetic*
$\forall n \in \mathbb{Z}$ except 0 is a product of primes

Theorem. *Let $n > 1$. If n has no positive prime factors less than or equal to $\sqrt{n}$ then n is prime*

Practice Problems

1. Find the quotient q and remainder r when a is divided by b w/o the usage of technology
   (a) a = 17 b = 4
   (b) a = -51 and b = 6
2. Let a be any integer and let b and c be any integer divided by b, the quotient be q,and the remainder be r, so that
$$a = bq + r; 0 \geq r < b$$

3. Find the GCD

   (a) (56,72)

   (b) (143, 231)

4. Express the numbers as a product of primes

   (a) 5040

   (b) 2042040

5. Which of the following are prime

   a) $2^5 - 1$

   b) 1951