1. Return quizzes (33 total, 62.1% ave., 0 perfects, 6 scores of 9.5; 6 A’s, 2 B’s, 8 C’s, 4 D’s, 13 F’s)

2. Go over homework questions.

3. Homework: pages 138–139, numbers 1, 3, 5, 6, 7, 11, 29, 30, 31, 33
   page 146, numbers 1, 5, 7(b), 8(b)
   Quiz: Thursday (09/20)
   Test: Tuesday (10/02) ← as voted on in class

4. **Definitions:**
   \( r \) is rational \iff \exists \text{ integers } a \text{ and } b \text{ such that } r = a/b \text{ and } b \neq 0
   \( r \in \mathbb{R} \) is irrational \iff r is not rational

5. **Example:** Explain why the sum of two rational numbers is rational.

6. **Definitions and Notations:** For \( n \) and \( d \) integers with \( d \neq 0 \), we write \( d \mid n \) (read “d divides n”) if \( \exists k \in \mathbb{Z} \) such that \( n = kd \). The following all have the same meaning:
   \( d \) divides \( n \)
   \( d \) is a factor of \( n \)
   \( d \) is a divisor of \( n \)
   \( n \) is divisible by \( d \)
   \( n \) is a multiple of \( d \)

7. **Examples:**
   (1) Each of the following are true:
   
   \[
   2 \mid 22 \quad 3 \mid 21 \quad 7 \mid 21 \quad 6 \mid (-36) \quad (-6) \mid 36 \quad (-6) \mid (-36) \quad 1 \mid 17 \quad 23 \mid 0 \quad 3 \mid (-3) \quad 6 \mid 3 \quad 6 \mid 7
   \]

   (2) What are the divisors of 18?

   (3) What are the prime divisors of 18?

   (4) If \( p \) is a prime, then what are its divisors?

   (5) page 138, numbers 4, 12

8. **Theorem 3.3.3** [Unique Factorization Theorem or The Fundamental Theorem of Arithmetic]: Every positive integer > 1 can be written uniquely in the form
   \[
   p_1^{e_1} p_2^{e_2} \cdots p_k^{e_k},
   \]
   where \( p_1, p_2, \ldots, p_k \) are primes and \( e_1, e_2, \ldots, e_k \) are positive integers, except for the order in which the prime powers appear.

9. **Examples:**
   (1) Completely factor 120?

   (2) Completely factor 221?

10. **Comment:** If a positive integer \( n \) is composite, then \( n \) has a divisor > 1 and \( \leq \sqrt{n} \). Furthermore, one can find such a divisor that is prime.

11. **Theorem 3.4.1** If \( n \) and \( d \) are integers with \( d > 0 \), then there exist unique integers \( q \) (called the “quotient”) and \( r \) (called the “remainder”) satisfying

   \[
   n = dq + r \quad \text{and} \quad 0 \leq r < d.
   \]

**Note:** The notation \( n \mod d \) is used to denote the remainder \( r \).