Section 7.1: Decimals

- **Decimals**: are used to represent fractions in our usual base ten place value notation.

We can also write decimals in expanded form:

\[ 327.24 = (3 \cdot 100) + (2 \cdot 10) + (7 \cdot 1) + \left( 2 \cdot \frac{1}{10} \right) + \left( 4 \cdot \frac{1}{100} \right) \]

- **Converting fraction to decimal**: Write the following fraction as a decimal.

\[ \frac{3}{50} \]

- **Converting decimal to fraction**: Write the following decimal as a fraction.

\[ .243 \]

**THREE TYPES OF DECIMALS**

1. **terminating decimals**: decimals that can be represented using a finite number of nonzero digits to the right of the decimal point.

   **Theorem 1** Let \( \frac{a}{b} \) be a fraction in simplest form. Then \( \frac{a}{b} \) has a terminating decimal representation if and only if \( b \) contains only 2s and/or 5s in its prime factorization.

2. **repeating decimals**: decimal representation does not terminate, but repeats. (These will be discussed further in Section 7.2)

3. **nonterminating, nonrepeating decimals**: decimal representation does not terminate nor does it repeat. (These are called irrational numbers and we will discuss these more in Section 9.2)

- **Exercises**: Determine if the following fractions represent a terminating decimal.

  a) \( \frac{2}{5} \)  
  b) \( \frac{3}{14} \)  
  c) \( \frac{3}{200} \)  
  d) \( \frac{3}{600} \)