As you may recall, an equation whose graph is a straight line is called a linear function. A linear function has an equation that can be written in the form of \( y = mx + b \). Equations whose graphs are not straight lines are called **nonlinear functions**. Some nonlinear functions have specific names. A **quadratic function** is nonlinear and has an equation in the form of \( y = ax^2 + bx + c \), where \( a \neq 0 \). Another nonlinear function is a **cubic function**. A cubic function has an equation in the form of \( y = ax^3 + bx^2 + cx + d \), where \( a \neq 0 \).

### Function Equation Graph

<table>
<thead>
<tr>
<th>Function</th>
<th>Equation</th>
<th>Graph</th>
</tr>
</thead>
<tbody>
<tr>
<td>Linear</td>
<td>( y = mx + b )</td>
<td>![Graph of a linear function]</td>
</tr>
<tr>
<td>Quadratic</td>
<td>( y = ax^2 + bx + c ), ( a \neq 0 )</td>
<td>![Graph of a quadratic function]</td>
</tr>
<tr>
<td>Cubic</td>
<td>( y = ax^3 + bx^2 + cx + d ), ( a \neq 0 )</td>
<td>![Graph of a cubic function]</td>
</tr>
</tbody>
</table>

### Examples

**Determine whether the function is linear or nonlinear.**

- **a.** \( y = 4x \)
  - Linear, \( y = 4x \) can be written as \( y = mx + b \).

- **b.** \( y = x^2 + x - 2 \)
  - Nonlinear, \( y = x^2 + x - 2 \) cannot be written as \( y = mx + b \).

- **c.** \( y = \frac{7}{x} \)
  - Nonlinear, \( y = \frac{7}{x} \) cannot be written as \( y = mx + b \).

### Practice

**Determine whether the function is linear or nonlinear.**

1. \( y = 5 \)
2. \( 2x + 3y = 10 \)
3. \( y = 7x^2 \)
4. \( xy = -13 \)

5. **Standardized Test Practice** Select the nonlinear function.
   - **A** \( y = -3x - 5 \)
   - **B** \( y = 0.75 \)
   - **C** \( y = 3x^2 \)
   - **D** \( y = \frac{1}{2}x + 2 \)