1. An \( x \)-intercept of the graph of an equation in \( x \) and \( y \) is a point where the graph intersects the \( x \)-axis. A \( y \)-intercept is a point where the graph intersects the \( y \)-axis.

**Examples**

(a) Find the \( x \)- and \( y \)-intercepts of the graph of \( y = 2x + 3 \), and sketch the graph.
(b) Determine the intercepts, if any, of the graph of \( s = \frac{100}{t} \), and sketch the graph.
(c) Determine the intercepts of the graph of \( x = 3 \), and sketch the graph.

2. Each function \( f \) gives rise to an equation, namely \( y = f(x) \). Its graph consists of all points \((x, f(x))\), where \( x \) is in the domain of \( f \).

(a) Graph \( f(x) = \sqrt{x} \). (Square-root function)
(b) Graph \( p = G(q) = |q| \). (Absolute-value function)

3. A zero of a function \( f \) is any value of \( x \) such that \( f(x) = 0 \).

4. The zeros of a function are precisely the \( x \)-intercepts of its graph.

5. How to determine the domain and range of a function by looking at its graph?

Answer: In general, the domain consists of all \( x \)-values that are included in the graph, and the range is all \( y \)-values that are included. For example, the domain and range of \( f(x) = \sqrt{x} \) are all nonnegative numbers, while the domain of \( p = G(q) = |q| \) is all real numbers and the range is all \( p \geq 0 \).

**Example**

(a) Graph the case-defined function

\[
f(x) = \begin{cases} 
  x & \text{if } 0 \leq x < 3 \\
  x - 1 & \text{if } 3 \leq x \leq 5 \\
  4 & \text{if } 5 < x \leq 7 
\end{cases}
\]
6. How to tell whether a curve is the graph of a function?

Answer: Apply the vertical-line test: If a vertical line \( L \) can be drawn that intersects a curve in at least two points, then the curve is not the graph of a function of \( x \), and when no such vertical line can be drawn, the curve is the graph of a function of \( x \).

Example

(a) Graph \( x = 2y^2 \).

7. After we know that a curve in question is the graph of a function, how to determine whether this function is one-to-one?

Answer: Apply the horizontal-line test: If a horizontal line \( L \) can be drawn that intersects the graph of a function in at least two points, then the function is not one-to-one, and when no such horizontal line can be drawn, the function is one-to-one.

Assignment Do Problems 2.5: 6, 10, 12, 14, 30, 32, 36, 40.