Exercise 4

In Exercises 1–6, find the domain and range of each function.

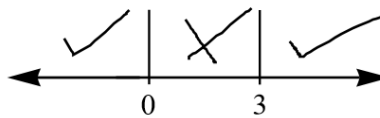$$g(x) = \sqrt{x^2 - 3x}$$

Solution

Only values of $x^2 - 3x$ that are zero or positive can be plugged into a square root function:

$$x^2 - 3x \geq 0$$

$$x(x - 3) \geq 0 \tag{1}$$

$$\text{Critical Points:} \quad x = \{0, 3\}$$

The critical points divide the number line into zones. Choose a number within each of these zones, plug it into inequality (1), and check whether the statement is true or false.

As a result,

$$\text{Domain:} \quad \{x \mid x \leq 0,\ x \geq 3\}.$$

The $\sqrt{x^2 - 3x}$ term can be either zero or higher than that, so the lowest value of g is 0 and the highest value of g is ∞.

$$\text{Range:} \quad \{y \mid 0 \leq y < \infty\}$$