Square Root Functions

A function that contains the square root of a variable expression is a square root function. The domain of a square root function is those values for which the radicand is greater than or equal to 0.

Example

Graph \( y = \sqrt{3x - 2} \). State its domain and range.

Since the radicand cannot be negative, the domain of the function is \( 3x - 2 \geq 0 \) or \( x \geq \frac{2}{3} \).

The \( x \)-intercept is \( \frac{2}{3} \). The range is \( y \geq 0 \).

Make a table of values and graph the function.

<table>
<thead>
<tr>
<th>( x )</th>
<th>( y )</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \frac{2}{3} )</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>( \sqrt{7} )</td>
</tr>
</tbody>
</table>

Exercises

Graph each function. State the domain and range.

1. \( y = \sqrt{2x} \)
2. \( y = -3\sqrt{x} \)
3. \( y = -\sqrt{\frac{x}{2}} \)
4. \( y = 2\sqrt{x - 3} \)
5. \( y = -\sqrt{2x - 3} \)
6. \( y = \sqrt{2x + 5} \)
Square Root Functions and Inequalities

A square root inequality is an inequality that contains the square root of a variable expression. Use what you know about graphing square root functions and graphing inequalities to graph square root inequalities.

Example

Graph \( y \leq \sqrt{2x - 1} + 2 \).

Graph the related equation \( y = \sqrt{2x - 1} + 2 \). Since the boundary should be included, the graph should be solid.

The domain includes values for \( x \geq \frac{1}{2} \), so the graph is to the right of \( x = \frac{1}{2} \).

Exercises

Graph each inequality.

1. \( y < 2\sqrt{x} \)

2. \( y > \sqrt{x} + 3 \)

3. \( y < 3\sqrt{2x - 1} \)

4. \( y < \sqrt{3x - 4} \)

5. \( y \geq \sqrt{x + 1} - 4 \)

6. \( y > 2\sqrt{2x - 3} \)

7. \( y \geq \sqrt{3x + 1} - 2 \)

8. \( y \leq \sqrt{4x - 2} + 1 \)

9. \( y < 2\sqrt{2x - 1} - 4 \)