\[ f(x) = \frac{\sqrt{x+5}}{2x-1} \]

- Find Domain of \( f \).

Even index root \((\sqrt[n]{x}, \text{where } N \text{ is even})\) means radicand \((x \geq 0)\) must be positive.

\[
x + 5 \geq 0 \\
x \geq -5
\]

\[
x - 1 \neq 0 \quad \text{(division by 0)} \\
x \neq 1
\]

\[
x \neq \frac{1}{2}
\]

\[
\text{Domain: } [-5, \frac{1}{2}) \cup (\frac{1}{2}, \infty)
\]

1.1 Linear equations w/ two variables \((Ax + By = C, \text{where } A, B, C \text{ are real #s})\)

\[ Ax + By = C \quad \text{Standard/General form} \]

\[ y = mx + b \quad \text{Slope-Intercept form} \]

\[
\begin{cases} 
  m = \text{slope} \\
  (0, b) = y \text{-intercept}
\end{cases}
\]
16) \(-2x + y = 4\)

Find \(x\)-int, \(y\)-int, \& graph

\[-2x + 0 = 4\]
\[-2x = 4\]
\[x = -2\]
\((-2,0)\)
\(x\)-int

\[x(0) + y = 4\]
\[y = 4\]
\((0, 4)\)
\(y\)-int

15) \(5y + 1 = 11\)

\(x\)-value is missing

Therefore, no \(x\)-int, line won't cross \(x\)-axis

19) \(2x = 3y\)

\[2x = 3(0)\]
\[2x = 0\]
\[x = 0\]
\((0, 0)\)
\(x\)-int

\[5y = 10\]
\[y = 2\]
\((0, 2)\)
\(y\)-int

Need to figure out if slope is positive or negative.

\[\frac{2(3)}{6} = \frac{3y}{2-x}\]

Choose any value for \(x\) or \(y\), find corresponding \(y\) or \(x\) value. Then graph it.
Given this graph, find slope:

\[
M = \frac{\text{rise}}{\text{run}} = \frac{y_2 - y_1}{x_2 - x_1}
\]

\[
P_1(x_1, y_1) = P_1(-3, -2)
\]

\[
P_2(x_2, y_2) = P_2(2, 1)
\]

Pg. 162

27) \((17, 9) \leftrightarrow (42, -6)\), find slope:

\[
M = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-6 - 9}{42 - 17} = \frac{-15}{25} = \frac{-3}{5}
\]

\((9, -1) \leftrightarrow (9, 5)\)

\[
M = \frac{y_2 - y_1}{x_2 - x_1} = \frac{5 - (-1)}{9 - 9} = \frac{6}{0}
\]

Cannot divide by 0!

Therefore, no slope / undefined.
41. \[ \text{Slope: } \frac{\text{rise}}{\text{run}} = \frac{0}{0} \text{ is undefined} \]

For any vertical line.

42. \[ \text{Slope: } \frac{\text{rise}}{\text{run}} = \frac{\#}{0} = \text{undefined} \]

For any horizontal line.

51. \[ 2x - 4y = 8 \]

Standard form.

Find slope, y-intercept, and graph.

To find slope, change equation to slope-intercept form.

\[ 2x - 4y = 8 \]

\[ -4y = 8 - 2x \]

\[ y = \frac{2}{4}x - \frac{8}{4} \]

\[ y = \frac{1}{2}x - 2 \]

\[ \text{slope } m = \frac{1}{2}, \ b = -2 \]
61) \( \frac{x}{4} + \frac{y}{7} = 1 \)

Make all factors have common denominator and cancel out.

\[
\frac{x}{4} \left( \frac{7}{7} \right) + \frac{y}{7} \left( \frac{4}{4} \right) = 1 \left( \frac{28}{28} \right)
\]

\[
\frac{7x}{28} + \frac{4y}{28} = \frac{28}{28}
\]

\[
7x + 4y = 28
\]

\[
y = -\frac{7}{4}x + 28
\]

\[
y = -\frac{7}{4}x + 7
\]

\[
m = -\frac{7}{4}
\]

\[
b = 7, \ y-\text{int} = (0, 7)
\]

67) (1, -6); \( m = -3 \)

a) Write an equation in slope-intercept form that crosses through (1, -6) and has slope \( m = -3 \)

Answer:

\[
y = -3x + 3
\]

b) Write \( y = -3x + 3 \) as a function.

\[
f(x) = -3x + 3
\]
If \( m = 0 \), horizontal line is \( y = \text{constant} \)

\[ y = 0 \]

\[ y = x + b \]

\[ y = \frac{2}{3} x + \frac{1}{3} \]

\[ f(x) = \frac{2}{3} x + \frac{1}{3} \]

\[ y = \frac{2}{3} x + \frac{1}{3} \]

\[ y = \frac{2}{3} (x + 1) \]

As a function, \( f(x) \) was already given.

Find slope of line through two given points.

\[ m = \frac{y_2 - y_1}{x_2 - x_1} \]

If two points are given, line passes through the two given points.

\[ m = \frac{3 - 0}{3 - 1} = \frac{3}{2} \]

\[ m = \frac{0 - 9}{1 - 3} = \frac{9}{2} \]

\[ y = \frac{9}{2} x + b \]

\[ y = 0 \]

\[ y = x + b \]

\[ y = \frac{2}{3} x + \frac{1}{3} \]

\[ y = \frac{2}{3} (x + 1) \]

\[ f(x) = \frac{2}{3} x + \frac{1}{3} \]

\[ y = \frac{2}{3} x + \frac{1}{3} \]
\[ y = \frac{3}{2} x + \frac{1}{2} \]

Other forms of slope equation,

\[ m = \frac{\text{rise}}{\text{run}} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{f(x_2) - f(x_1)}{x_2 - x_1} = \frac{f(b) - f(a)}{b - a} \]

<table>
<thead>
<tr>
<th>Time t in hours</th>
<th># of bacteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1000</td>
</tr>
<tr>
<td>3.1</td>
<td>1589</td>
</tr>
<tr>
<td>6.2</td>
<td>2612</td>
</tr>
<tr>
<td>12.4</td>
<td>4100</td>
</tr>
<tr>
<td>15.5</td>
<td>6425</td>
</tr>
</tbody>
</table>

Will finish next time.

(a) Find average rate of change.

\[
\frac{f(3.1) - f(0)}{3.1 - 0} = \frac{1589 - 1000}{3.1 - 0} = \frac{589}{3.1} \]