Section 3.4: The Slope of a Line

The slope of a line is defined as the ratio of vertical change to horizontal change ("rise over run").

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

Analyzing a set of data to determine whether it can be modeled by a linear function.

As a class, you need to know Section 3.4.

Determine whether the given function can be modeled by a linear function. If linear, determine the slope.

<table>
<thead>
<tr>
<th>( x )</th>
<th>( y )</th>
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<tbody>
<tr>
<td>-2</td>
<td>-5</td>
</tr>
<tr>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>13</td>
</tr>
</tbody>
</table>

\[ m = \frac{4 - 1}{1 - 0} = \frac{3}{1} = 3 \]

\[ \left( x_1, y_1 \right) \left( x_2, y_2 \right) \]

\[ m = \frac{13 - 4}{4 - 1} = \frac{9}{3} = 3 \]
Quiz today

§ 3.4 The slope of a line

The slope of a line is defined as a ratio of vertical change to horizontal change ("rise over run").

Slope \( m \) \( \Rightarrow \frac{\text{rise}}{\text{run}} \Rightarrow m = \frac{y_2 - y_1}{x_2 - x_1} \)

Analyzing a set of data to determine whether it can be modeled by a linear function.

As a class you need to know § 3-4.1

Determine whether the given function can be modeled by a linear function. If linear, determine the slope.

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\( (x_1, y_1) \) \( (x_2, y_2) \)

\( m = \frac{y_2 - y_1}{x_2 - x_1} \)

\( (0, 1) \) \( (1, 3) \)

\( m = \frac{4 - 1}{1 - 0} = \frac{3}{1} = 3 \)

\( (1, 3) \) \( (4, 13) \)

\( m = \frac{13 - 4}{4 - 1} = \frac{9}{3} = 3 \)
Remember: \( m = \frac{y_2 - y_1}{x_2 - x_1} \)

\((-2, -5), (-1, 2)\)

\( m = \frac{2 - (-5)}{-1 + 2} = \frac{7}{1} \)

\((\frac{1}{2}, 1), (-1, -2)\)

\( m = \frac{1 - (-2)}{\frac{1}{2} + 1} = \frac{1}{2} \)

**Not Linear!**

Slope int form \( \Rightarrow y = mx + b \)

Slope \( \Rightarrow (9, b) \)

**Ex Slope int**

\( y = 3x + 2 \)

\( y = \frac{1}{3}x + 7 \)

**Ex Non Slope int**

\( 3x + 4y = 2 \) ← Standard form

non linear \( 2y = 2x + 4 \) ← y is not isolated

non linear \( y - 17 = \frac{17}{18}(x - \frac{1}{6}) \) ← Point slope form
27) Find the slope and the y-int of the line.

\[ f(x) = \frac{5}{6}x \]

\[ y = mx + b \quad \text{(y-int)} \]

\[ f(x) = \frac{5}{6}x + 0 \]

\[ (0, 0) \quad \text{answer} \]

\[ \text{slope} \]

\[ m = \frac{5}{6} \quad \text{Slope} \]

AACMN-SP 2.6

Find the slope and the y-int of the line.

\[-9x - 5y = 19 \quad \text{put in slope-int for } y = mx + b\]

\[-9x - 8y = 19 + 9x + 9x \]

\[-8y = 19x + 14 \]

\[-8 \quad -8 \]

\[ y = -\frac{9}{8}x - \frac{14}{8} \quad \text{Simplified} \]

\[ (0, -\frac{7}{4}) \quad \text{y-int} \]

Properties of fractions

\[-\frac{a}{b} = -\frac{-a}{b} = \frac{a}{b}\]

\[ \frac{a \times 7}{b} = \frac{a}{b} \times x \]
49. Determine whether the lines are parallel, perpendicular, or neither.

\[ \frac{-4x + 7y = 1}{7x + 4y = 16} \]

\[ \frac{-9x + 7y = 1}{9x + 4y} \]

\[ \frac{7y = 4x + 1}{-7x} \]

\[ \frac{4y = -7x + 16}{-4x} \]

\[ y = \frac{4}{7}x + \frac{1}{7} \]

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

*Remember Perpendicular → take its reciprocal and change the sign.

Slopes are different \( \neq \) Parallel

43. Same instructions

\[ \frac{-8x + 2y = 5}{4x - y = 7} \]

\[ \frac{-8x + 2y = 5}{+8x} \]

\[ \frac{2y = 8x + 5}{2} \]

\[ y = 4x + \frac{5}{2} \]

\[ y = -\frac{9x}{4} + 7 \]

Slopes are the same → parallel