Preliminaries and Objectives

Preliminaries

- Cartesian Coordinate System

Objectives

- Define slope
- Find additional points using slope
Population Growth

<table>
<thead>
<tr>
<th>Year</th>
<th>Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>1970</td>
<td>18,000</td>
</tr>
<tr>
<td>1980</td>
<td>22,000</td>
</tr>
</tbody>
</table>

Finding Other Points

\[ y \]

- (1980, 22000)
- (1977, \( y \))
- (1970, 18000)

\[ \text{slope} = 400 = \frac{y - 18000}{1977 - 1970} = \frac{y - 18000}{7} \]

\[ \Rightarrow \quad 7(400) = y - 18000 \]
\[ \Rightarrow \quad 18000 + 7(400) = y \]
\[ \Rightarrow \quad y = 20800 \]
Finding Other Points

\[ y \]

- (1980, 22000)
- (1977, y)
- (1970, 18000)

\[ \text{slope} = 400 = \frac{y - 22000}{1977 - 1980} = \frac{y - 22000}{-3} \]

\[ \implies (-3)(4000) = y - 22000 \]

\[ \implies 22000 - 3(400) = y \]

\[ \implies y = 20800 \]
Finding Other Points

\[ y \]

- \((x, 40000)\)
- \((1970, 18000)\)

\[
\text{slope} = 400 = \frac{40000 - 18000}{x - 1970} = \frac{22000}{x - 1970}
\]

\[ \implies (400)(x - 1970) = 22000 \]

\[ \implies x - 1970 = \frac{22000}{400} = 55 \]

\[ \implies x = 2025 \]
Recap

\[ \Delta = \text{change in} \]

If two data points \((x_1, y_1)\) and \((x_2, y_2)\) are connected by a straight line, then the slope between the two points is given by the formula:

\[ \text{slope} = \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1} \]
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