Rates of Change

UNIVERSITY OF MINNESOTA
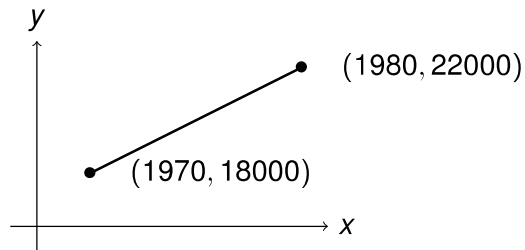

Preliminaries and Objectives
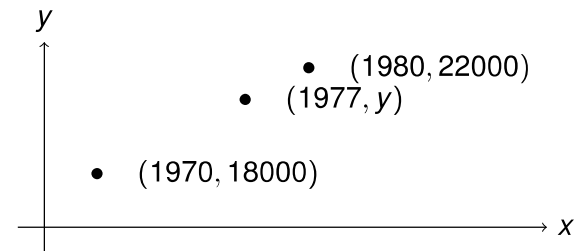
Preliminaries

- Cartesian Coordinate System

Objectives

- Define **slope**
- Find additional points using slope
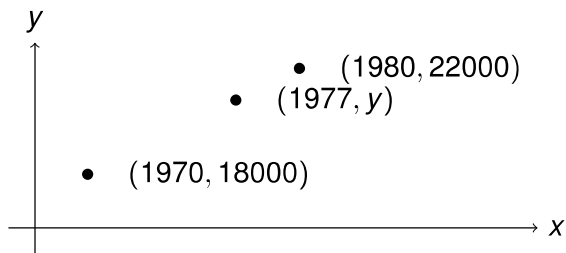

Population Growth

Year	Population
1970	18,000
1980	22,000

$(1980, 22000)$

$(1970, 18000)$

Finding Other Points

$(1980, 22000)$

$(1977, y)$

$(1970, 18000)$

$$\text{slope} = \quad 400 = \frac{y - 18000}{1977 - 1970} = \frac{y - 18000}{7}$$

$$\implies \quad 7(400) = y - 18000$$

$$\implies \quad 18000 + 7(400) = y$$

$$\implies \quad y = 20800$$

y

$\bullet$ $(1980, 22000)$

$\bullet$ $(1977, y)$

$\bullet$ $(1970, 18000)$

x

$$\text{slope} = \quad 400 = \frac{y - 22000}{1977 - 1980} = \frac{y - 22000}{-3}$$
$$\implies \quad (-3)(4000) = y - 22000$$
$$\implies \quad 22000 - 3(400) = y$$
$$\implies \quad y = 20800$$

y

$\bullet$ $(x, 40000)$

$\bullet$ $(1970, 18000)$

x
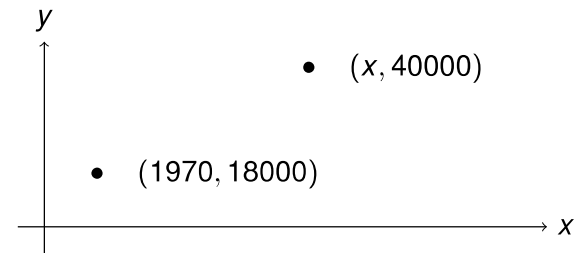
$$\text{slope} = \quad 400 = \frac{40000 - 18000}{x - 1970} = \frac{22000}{x - 1970}$$
$$\implies \quad (400)(x - 1970) = 22000$$
$$\implies \quad x - 1970 = \frac{22000}{400} = 55$$
$$\implies \quad x = 2025$$

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

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

Credits

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