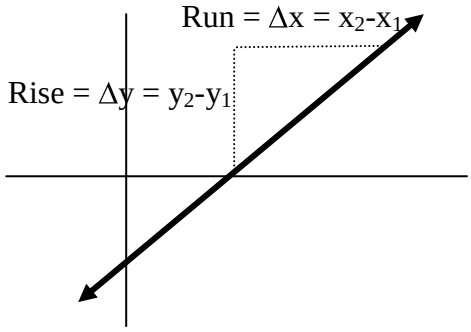
MA 160 Linear and Power Functions
Sections 1.3, 1.4

I. Slope and Linear Functions



1. The **slope** *m* of the line passing through the points (x_1, y_1) *and* (x_2, y_2) is defined by

$$m = \frac{Rise}{Run} = \frac{vertical\ change}{horizontal\ change} = \frac{\Delta y}{\Delta x}$$

$$= \frac{difference\ in\ y}{difference\ in\ x} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{y_1 - y_2}{x_1 - x_2},\ where\ x_1 \neq x_2$$

Use the slope formula to find the slope of the line containing the points

(a) (-2, 4) and (1, 10) (b) (-3, 4) and (-1, -5)

2. You can use either of the following to find the equation of a line.

Slope-Intercept Equation	**Point-Slope Equation**
$y = mx + b$ *or* $f(x) = mx + b$	$y - y_1 = m(x - x_1)$
The line has slope *m* and y-intercept $(0, b)$.	The line has slope *m* and contains the point (x_1, y_1).

Write an equation of the line through each pair of points in question #1 above. You may use either equation above, but write the answer in the form $y = mx + b$.

(a)	(b)

3. The slope of a line is a measure of the rate at which a line is changing. For that reason, it is also called the **rate of change** of the line.

In 1991, the cost of tuition and fees at public two-year colleges was $800. This cost had increased to $1300 by 1996. Find the average rate of change of the cost of tuition and fees during this time period. **Write a sentence interpreting your answer. Be sure to use appropriate units.**

4. **High blood pressure in men**

Age of male	**Percentage of males with high blood pressure**
30	7.3
40	12.1
50	20.4
60	24.8
70	34.9

(a) Using the points (40, 12.1) and (60, 24.8) from the data above, find a linear function that fits the given data.

(b) Use the function to estimate the percentage of 55-year-old men with high blood pressure.

II. Power Functions

A function of the form $f(x) = x^a$ is called a power function. In Calculus, we will often have to rewrite expressions involving negative exponents or radicals in the form $f(x) = Cx^a$, where C is a constant, in order to apply certain formulas to the function.

For example, each of the following functions can be rewritten in this form:

- $f(x) = \frac{1}{x^3}$ can be rewritten as $f(x) = x^{-3}$
- $f(x) = \frac{5}{x^4}$ can be rewritten as $f(x) = 5x^{-4}$
- $f(x) = \sqrt[3]{x^2}$ can be rewritten as $f(x) = x^{2/3}$
- $f(x) = -\frac{7}{\sqrt{x}}$ can be rewritten as $f(x) = -7x^{-1/2}$

Rewrite each function below in the form $f(x) = Cx^a$.

5. $f(x) = \frac{1}{x^8}$	6. $f(x) = \frac{3}{x^2}$	7. $f(x) = 6\sqrt{x}$
8. $f(x) = \sqrt[3]{x^4}$	9. $f(x) = -6\sqrt{x^3}$	10. $f(x) = \frac{5}{\sqrt[4]{x}}$