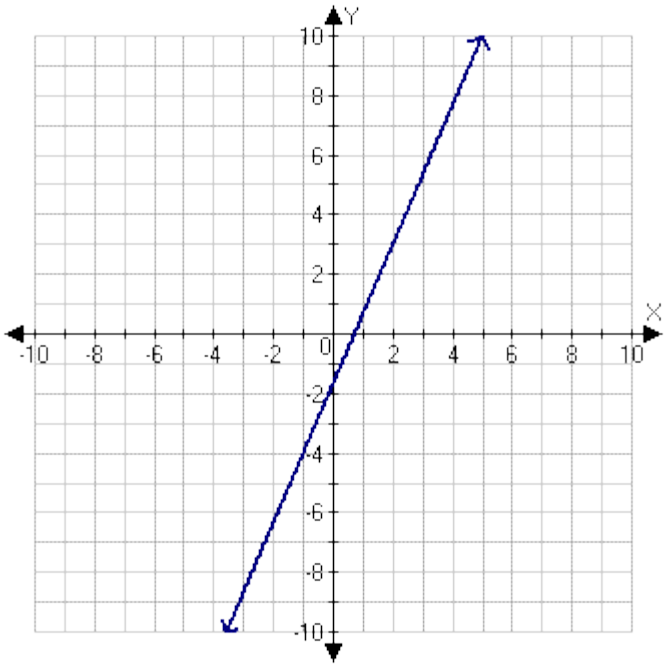
Review Exercise Set 13

Exercise 1: Find the slope and the equation of the line in the following graph. If the slope is undefined, then indicate it as such.



Exercise 2: Write a linear function that can be used to represent the data in the given table below.

Projected Social Security Beneficiaries

Years since 1980	(in millions)
0	35.6
1	42.6
2	49.5
3	56.5
4	63.4
5	70.4
6	77.3
7	84.3
8	91.2
9	98.2

Exercise 3: If a line passes through the points (-3, -4) and (6, 4), find the change in y with respect to a 1-unit change in x.

Exercise 4: The number of students tutored in the SLAC, between the 2000 and 2004 academic years, is shown below. Plot the points connecting them with line segments. During which period did the SLAC have the greatest average rate of change?

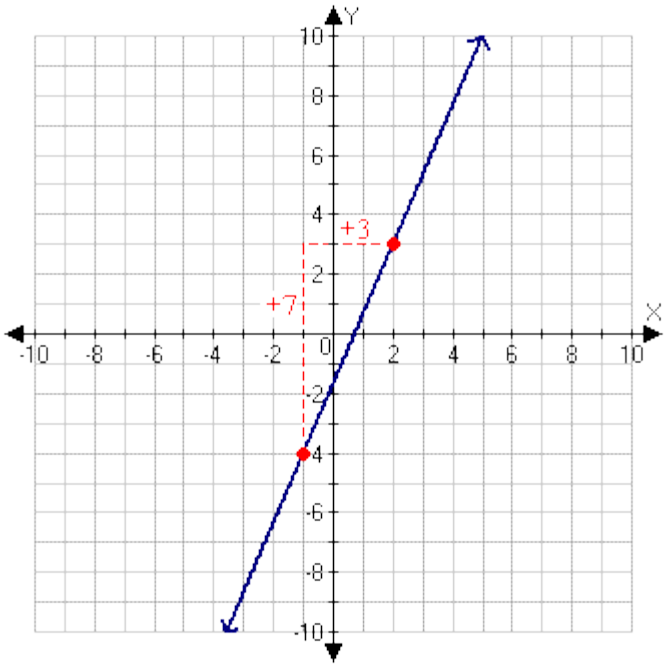
SLAC Tutoring Service	
Academic Year	Students
2000	3573
2001	4161
2002	4835
2003	5296
2004	5920

Exercise 5: If the graph of $f(x) = \frac{1}{2}x - 4$ is translated down 5 units, determine

a) the slope of the translated graph
b) the y-intercept of the translated graph
c) the equation of the translated graph

Review Exercise Set 13 Answer Key

Exercise 1: Find the slope and the equation of the line in the following graph. If the slope is undefined, then indicate it as such.



From the graph we can pick the two points of (-1, -4) and (2, 3) to determine the slope. Starting at the point (-1, -4) we must go up 7 units and then to the right 3 units in order to get to the second point of (2, 3). We could also determine this using the slope formula.

$$m = \frac{3-(-4)}{2-(-1)}$$
$$= \frac{3+4}{2+1}$$
$$= \frac{7}{3}$$

So the rise is 7 and the run is 3, which will give us a slope of 7/3. To find the equation we can use the point-slope form of a line.

Exercise 1 (Continued):

Let $(x_1, y_1) = (2, 3)$ and $m = \frac{7}{3}$

$$y - y_1 = m(x - x_1)$$
$$y - 3 = \frac{7}{3}(x - 2)$$
$$y - 3 = \frac{7}{3}x - \frac{14}{3}$$
$$y = \frac{7}{3}x - \frac{14}{3} + 3$$
$$y = \frac{7}{3}x - \frac{14}{3} + \frac{9}{3}$$
$$y = \frac{7}{3}x - \frac{5}{3}$$

Exercise 2: Write a linear function that can be used to represent the data in the given table below.

Projected Social Security Beneficiaries	
Years since 1980	(in millions)
0	35.6
1	42.6
2	49.5
3	56.5
4	63.4
5	70.4
6	77.3
7	84.3
8	91.2
9	98.2

First, choose two points to use in determining the slope

(0, 35.6) and (9, 98.2)

$$m = \frac{98.2 - 35.6}{9 - 0}$$
$$= \frac{62.6}{9}$$
$$\approx 6.96$$

Exercise 2 (Continued):

Since we are given the y-intercept, (0, 35.6), we can now use the slope-intercept form to write the linear function

$y = mx + b$
$y = 6.96x + 35.6$

Exercise 3: If a line passes through the points (-3, -4) and (6, 4), find the change in y with respect to a 1-unit change in x.

For this problem we want to determine the slope. Remember that the slope is equal to the change in y over the change in x.

$$m = \frac{4-(-4)}{6-(-3)}$$
$$= \frac{4+4}{6+3}$$
$$= \frac{8}{9}$$

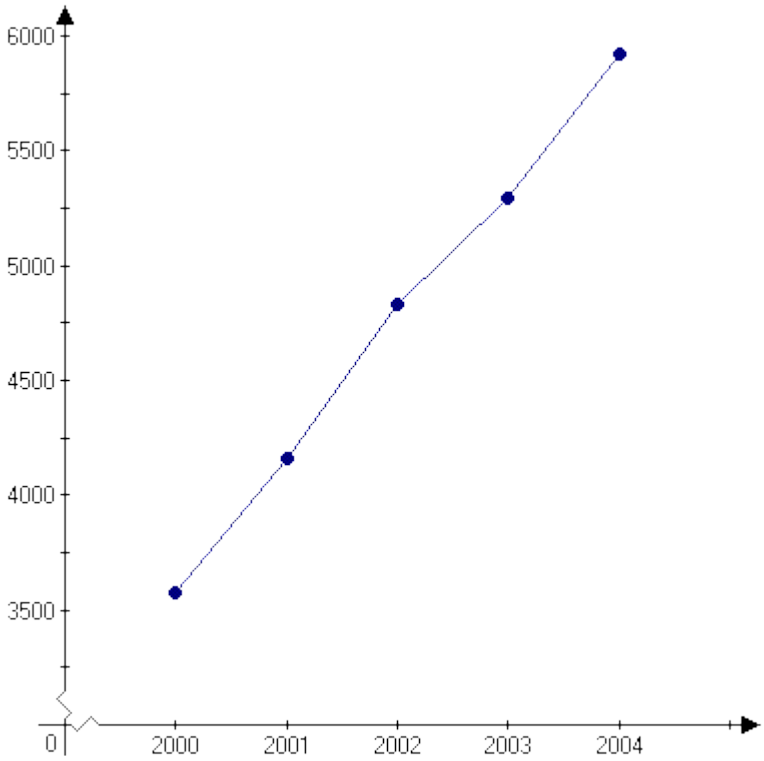
For every 1-unit change in x the change in y will be $\frac{8}{9}$

Exercise 4: The number of students tutored in the SLAC, between the 2000 and 2004 academic years, is shown below. Plot the points connecting them with line segments. During which period did the SLAC have the lowest average rate of change?

SLAC Tutoring Service

Academic Year	Students
2000	3573
2001	4161
2002	4835
2003	5296
2004	5920

Exercise 4 (Continued):



The lowest average rate of change occurred between the 2002 and 2003 academic years because this is where the slope was the smallest.

Exercise 5: If the graph of f(x) = $\frac{1}{2}$ x - 4 is translated down 5 units, determine

a) the slope of the translated graph

The slope of the graph will not change since all of the points on the graph will be translated down 5 units. The slope will be 1/2.

b) the y-intercept of the translated graph

Since the graph is being translated down 5 units the y-intercept would be moved down 5 units. Therefore, we must subtract 5 from the y-coordinate of the y-intercept.

y-intercept of the original graph is at (0, -4)

(0, -4 - 5) = (0, -9)

y-intercept of the translated graph is at (0 , -9)

Exercise 5 (Continued):

c) the equation of the translated graph

$m = \frac{1}{2}$ and b = -9

y = mx + b

$y = \frac{1}{2}x - 9$