

Show all your work on this paper. Solutions without correct supporting work will not be accepted. All answers must be exact.

1. Write an equation of the line that satisfies the given conditions. Put your answers in slope-intercept form. (3 points each)

a. The line passes through the points (-2,3) and (5,2).

$$m = \frac{2-3}{5-(-2)} = -\frac{1}{7}$$

$$y-3 = -\frac{1}{7}(x+2)$$

$$y-3 = -\frac{1}{7}x - \frac{2}{7}$$

$$y = -\frac{1}{7}x + \frac{19}{7}$$

b. The line passes through (1,-2) and is parallel to the line  $2x-3y=7$ .

$$y+2 = \frac{2}{3}(x-1)$$

$$y+2 = \frac{2}{3}x - \frac{2}{3}$$

$$y = \frac{2}{3}x - \frac{8}{3}$$

$$-3y = -2x + 7$$

$$y = \frac{2}{3}x - \frac{7}{3} \rightarrow m = \frac{2}{3}$$

2. In 1995, 15% of all U.S. college freshmen listed business as their probable field of study. By 2000, this figure had increased to 16.7%. Find and interpret the average rate of change in the percent per year of freshmen listing business as their probable field of study. (3 points)

(1995, 15%), (2000, 16.7%)

The number of freshmen listing business is increasing at an average rate of

$$\text{Avg. rate of change} = m = \frac{16.7\% - 15\%}{2000 - 1995} = \frac{1.7\%}{5 \text{ yrs}} = 0.34\%/\text{yr}$$

3. The table below indicates how the percent of women in the civilian labor force has changed from 1955 to 1980. (6 points)

Year	% Women
1955	35.7
1960	37.7
1965	39.3
1970	43.3
1975	46.3
1980	51.5

$x=0 \rightarrow 1955$

a. Find a linear regression line that models the data.

$$y = .622x + 34.529 \quad (2 \text{ pts})$$

b. Use the linear regression model to estimate the percent of women in the work force in the year 2000.

$$2000 \rightarrow x=45 \quad y = .622(45) + 34.529 \approx 62.5\% \quad (2 \text{ pts})$$

c. Using the model predict the year when the percent of women in the work forces reaches 62%.

$$62 = .622x + 34.529$$

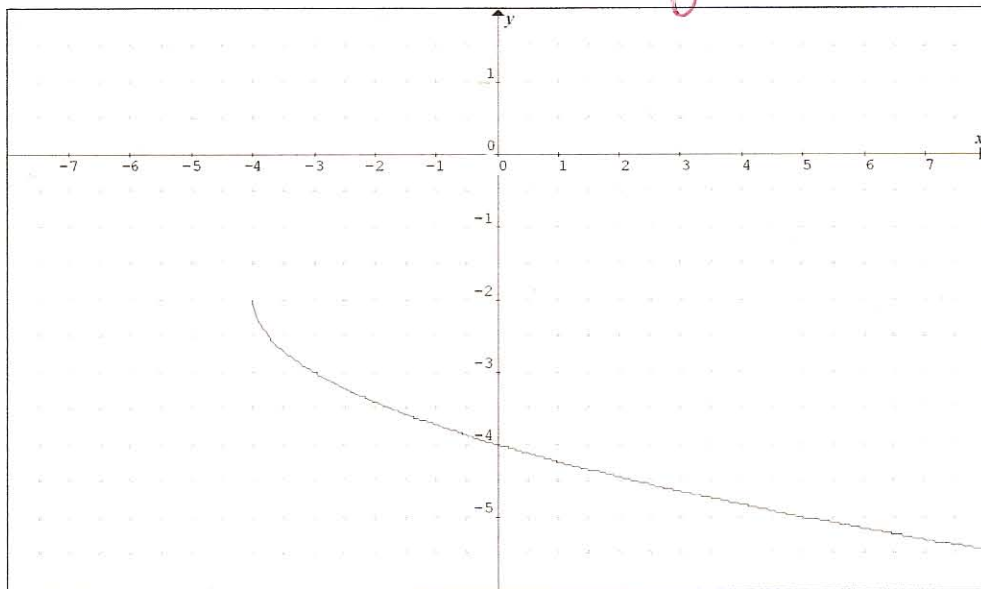
$$27.471 = .622x$$

$$x \approx 44.17$$

$$\text{Year} = 1999 \quad (2 \text{ pts})$$

4. Write the equation of the "basic graph" shown below:  $y = \sqrt{x}$  (1 point)

Write the equation of the actual graph shown below:  $y = -\sqrt{x+4} - 2$  (3 points)



5. Write the equation of the function whose graph has the same shape as  $y = |x|$  but that is shifted up 3 units, shifted to the right 2 units, and stretched vertically by 5. (3 points)

$$y = 5|x - 2| + 3$$

6. Given  $f(x) = 2x^2 - 5x$  and  $g(x) = \sqrt{x+3}$ , find: (8 points)

a.  $(f+g)(-1) = f(-1) + g(-1)$   
 $= 2 + 5 + \sqrt{2} = 7 + \sqrt{2}$  (2 pts)

b.  $(g \circ f)(x)$   
 $g(f(x)) = g(2x^2 - 5x) = \sqrt{2x^2 - 5x + 3}$  (3 pts)

c.  $\frac{f(x+h) - f(x)}{h} = \frac{2(x+h)^2 - 5(x+h) - (2x^2 - 5x)}{h}$   
 $= \frac{2x^2 + 4xh + 2h^2 - 5x - 5h - 2x^2 + 5x}{h}$   
 $= \frac{4xh + 2h^2 - 5h}{h} = 4x + 2h - 5$  (3 pts)