Chapter 4 Practice test

1) Suppose f(x) =-3x + 15   and g(x) = 7x + 5

a) Solve f(x) = 0

$$-3x+15=0$$
$$-15 \quad -15$$
$$\frac{-3x}{-3}=\frac{-15}{-3}$$
$$\boxed{x=5}$$

b) Solve f(x) > 0

$$-3x+15>0$$
$$-15 \quad -15$$
$$\frac{-3x}{-3}>\frac{-15}{-3}$$
$$\boxed{x<5}$$

flip since dividy by negative

c) Solve f(x) = g(x)

$$-3x+15=7x+5$$
$$-7x-15 \quad -7x-15$$
$$\frac{-10x}{-10}=\frac{-10}{-10}$$
$$\boxed{x=1}$$

d) Solve f(x) < g(x)

$$-3x+15<7x+5$$
$$-7x-15 \quad -7x-15$$
$$\frac{-10x}{-10}<\frac{-10}{-10}$$
$$\boxed{x>-1}$$

flip since Divide By negative

2) Suppose that the number of a units of a certain product that will be supplied (S) at price (p) (in dollars) is given by the equation:

$$S(p) = 6p - 5$$

Suppose that number of units of the same product that will be demanded (D) at price (p) (in dollars) is given by the equation:

$$D(p) = -4p + 15$$

a) How many units of the product will be supplied at a price of $3?

$S(3) = 6(3) - 5 = 13$ 13 units

b) How many units of the product will be demanded at a price of $3?

$D(3) = -4(3) + 15 = 3$ 3 units

c) At a price of $3 does the supply exceed demand, or does demand exceed ~~price~~ supply?

Supply Exceeds demand

d) Find the equilibrium price.

$$\begin{aligned} 6p - 5 &= -4p + 15 \\ +4p + 5 &\quad\ +4p + 5 \\ 10p &= 20 \\ p &= 2 \end{aligned}$$

$\boxed{\$2}$

e) How many units of the product will be supplied at the equilibrium price?

$S(2) = 6(2) - 5$ 7 units

f) How many units of the product will be demanded at the equilibrium price?

$D(2) = -4(2) + 15$ 7 units

3) A company makes a single product. The monthly cost (C) to make x units of the product can be found using the cost equation:

$C(x) = 3x + 500$

The monthly revenue (R) earned from selling x units of the product can be found using the revenue equation:
$R(x) = 8x$

a) Find the cost of making 50 units of the product during a month.

$C(50) = 3(50) + 500$ $650

b) Find the monthly revenue earned by selling 50 units of the product.

$R(50) = 8(50)$ $400

c) Is there a profit or loss when 50 units of the product are produced and sold in a month?

LOSS

d) What is the amount of the profit or loss?

$250 loss OR $-250 profit

$400 - 650$

e) Find the break-even quantity.

$$8x = 3x + 500$$
$$-3x \quad -3x$$
$$\frac{5x}{5} = \frac{500}{5}$$

100 units

f) What is the monthly cost at the break-even quantity?

$C(100) = 3(100) + 500$ $800

g) What is the monthly revenue at the break-even quantity?

$R(100) = 8(100)$ $800

h) What is the monthly profit at the break-even quantity?

$0

$800 - 800 = 0$

4) Use the data provided in the table to complete the following:

x	1	2	3	4	5
y	24	14	10	4	-2

a) Use the linear regression feature on your calculator to find the equation of the line of best fit. (round to 2-decimals)

$y = -6.2x + 28.6$

b) What is the value of r?

$r = .99$

c) How strong is the linear relationship?

Very Strong

d) Use the equation to predict the y-value that corresponds to x = 10. (round to 2 decimals if applicable)

$y = -6.2(10) + 28.6$

$y = -33.4$

5) The below shows the gas mileage (in miles per gallon) and the weight (in pounds) of certain cars.

Weight (in pounds)	Gas mileage
2200	33
4400	19
3200	26
4700	17
2300	37
4100	22

a) Use the linear regression feature on your calculator to find the equation of the line of best fit. (round to 2-decimals)

$y = -0.01x + 50.67$

b) What is the value of r? -0.98

c) How strong is the linear relationship? very strong

d) Use the equation to predict the gas mileage of a car that weighs 3000 pounds.

About 21mpg

6) $f(x-1)+2$

a) Find the indicated function and describe the transformation as compared to the function f(x) = x^2, specifically state if the graph is shifted left, right, up, down and if any reflection has occurred $f(x-1)+2=(x-1)^2+2$ Right 1 up 2

b) Make a table of values and sketch a graph. See below

c) State the domain and range of the function

domain $(-\infty,\infty)$ range $[2,\infty)$

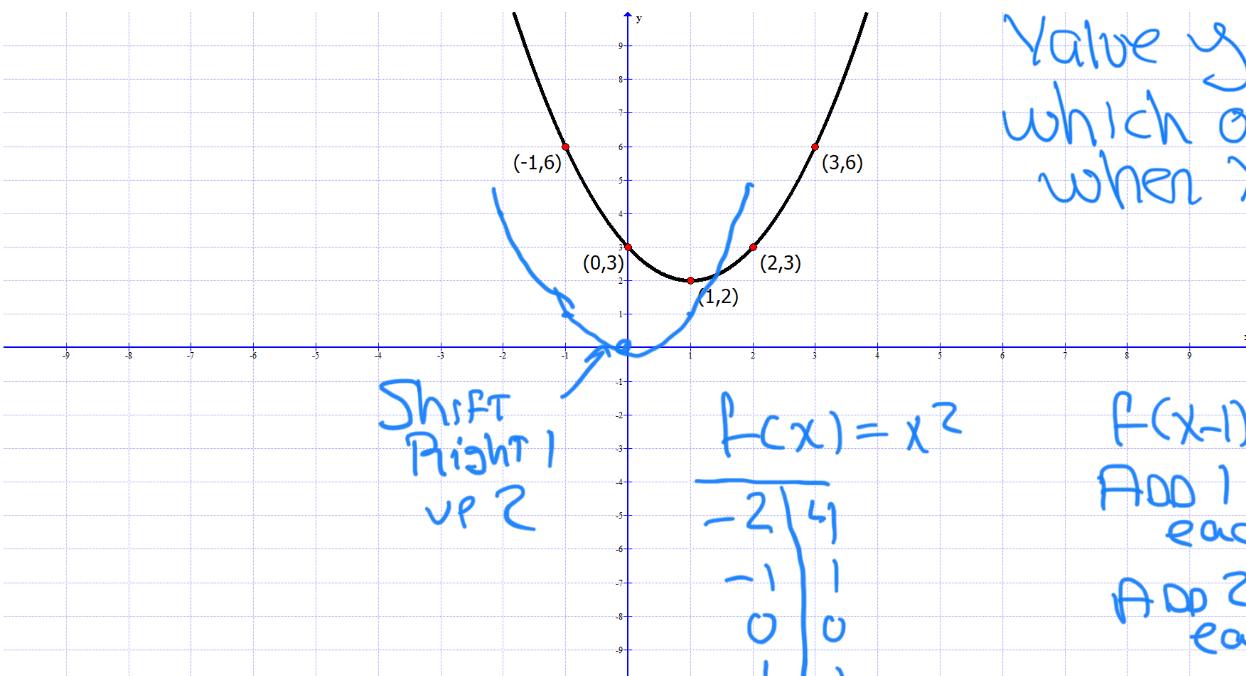
d) State the intervals where the function in increasing and decreasing

Increasing $(1,\infty)$ decreasing $(-\infty,1)$

e) State if the function has a local maximum point, if it does state the local maximum value none

f) State if the function has a local minimum point, if it does state the local minimum value local minimum point (1,2)

local minimum Value $y=2$ which occurs when $X=1$



$f(x)=x^2$

-2	4
-1	1
0	0
1	1
2	4

$f(x-1)+2$

ADD 1 TO each X

ADD 2 TO each y

-1	6
0	3
1	2
2	3
3	6

7) $f(x) = 2x^2 + 8x + 5$

a) Use completing the square to rewrite the problem in standard form

$c = \left(\frac{4}{2}\right)^2$

$c = (2)^2$

$c = 4$

$2(x^2 + 4x + c) + 5 - 2c$

$2(x^2 + 4x + 4) + 5 - 2(4)$

$f(x) = 2(x+2)^2 - 3$

b) Describe the transformation as compared to the function f(x) = x^2

Stretched, left 2, down 3

8) An object fired vertically into the air it will be at a height (h) in feet, t seconds after launching, determined by the equation

$h = -16t^2 + 160t.$

a) How long does it take for the ball to hit the ground?

$$-16T^2 + 160T = 0$$
$$-16T(T-10) = 0$$
$$-16T = 0 \qquad T - 10 = 0$$
$$T = 0 \qquad T = 10$$

$\boxed{\text{10 seconds}}$

b) When does the ball reach its maximum height?

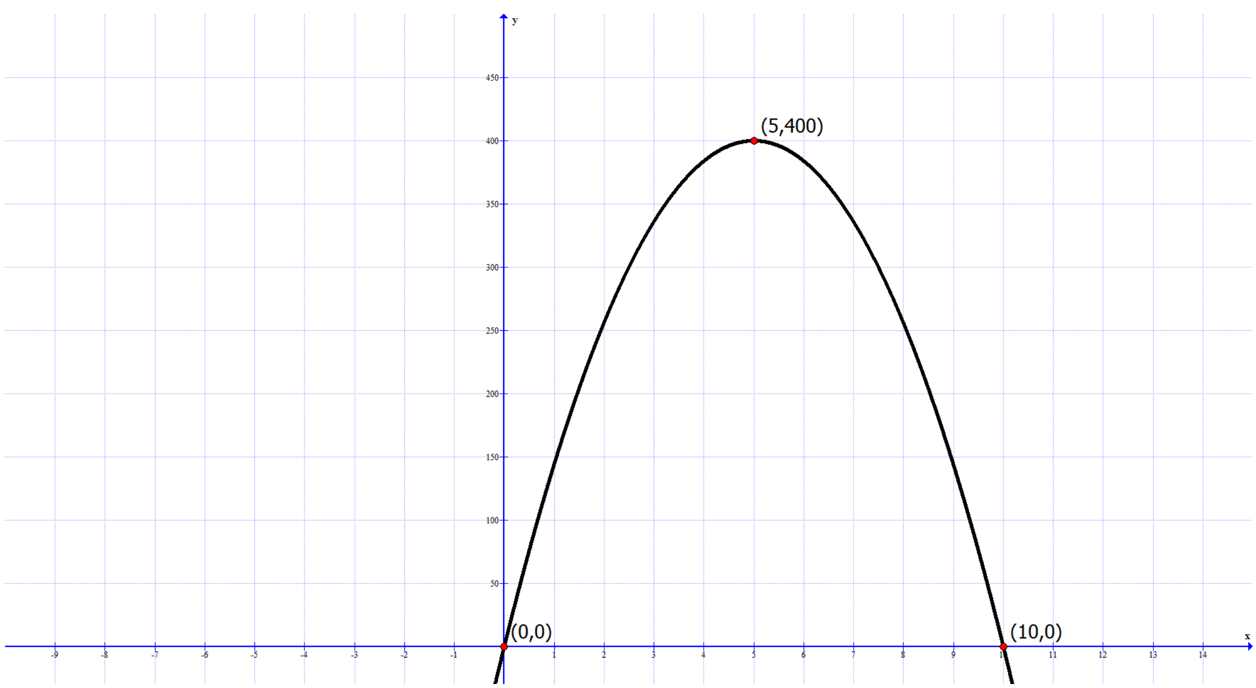
$$\frac{-b}{2a} = \frac{-160}{2(-16)} = \frac{-160}{-32}$$

$\boxed{\text{5 seconds}}$

c) What is the maximum height of the ball?

$$h = -16(5)^2 + 160(5)$$

$\boxed{\text{1400 ft}}$



9) A chain store manager has been told by the main office that daily profit, P, is related to the number of clerks working that day, x, according to the equations

$P(x) = -25x^2 + 250x$.

a) What number of clerks will maximize the profit?

$$\frac{-b}{2a} = \frac{-250}{2(-25)} = \frac{-250}{-50}$$ $\boxed{\text{5 clerks}}$

b) What is the maximum possible profit?

$$P(5) = -25(5)^2 + 250(5) = 625$$

$\boxed{\$625}$