

Section 2.3

2 Find using algebra the points of intersection of the graphs of the two functions.

$$f(x) = x^2 - 12x + 27 \quad \text{and} \quad g(x) = 2x^2 - 12x + 18$$

x-values:

$$\underline{x = 3 \quad x = -3}$$

$$f(x) = g(x)$$

$$x^2 - 12x + 27 = 2x^2 - 12x + 18$$

Coordinate points

$$\underline{(3, 0) \quad (-3, 72)}$$

$$0 = x^2 - 9$$

$$0 = (x - 3)(x + 3)$$

$$x = 3 \quad x = -3$$

if $x = 3$

$$\begin{aligned} f(3) &= 3^2 - 12(3) + 27 \\ &= 9 - 36 + 27 \\ &= 0 \end{aligned}$$

$$x = -3$$

$$\begin{aligned} f(-3) &= (-3)^2 - 12(-3) + 27 \\ &= 9 + 36 + 27 \\ &= 72 \end{aligned}$$

3.

Using substitution find the real zeros of the function.

$$P(x) = (2x - 6)^2 - 4(2x - 6) + 3$$

State the Substitution made:

$$\begin{aligned} u &= 2x - 6 \\ u^2 &= (2x - 6)^2 \end{aligned}$$

$$u^2 - 4u + 3 = 0$$

$$(u - 3)(u - 1) = 0$$

$$u = 3$$

$$u = 1$$

$$2x - 6 = 3$$

$$2x - 6 = 1$$

$$2x = 9$$

$$2x = 7$$

$$\boxed{x = \frac{9}{2}}$$

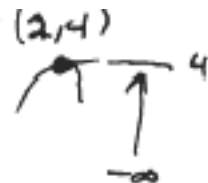
$$\boxed{x = \frac{7}{2}}$$

Section 2.4

4. Given: $f(x) = -2(x-1)^2 + 3$ a) List the transformation: Basic Function: $y = x^2$
- 1: Right 1
 - 2: reflect x-axis
 - 3: v. stretch factor of 2
 - 4: up 3

5.

Given: $f(x) = -x^2 + 4x$



- a) Find the Vertex.

$$x_v = \frac{-b}{2a} = \frac{-4}{2(-1)} = 2$$

$$y_v = f(2) = -(2)^2 + 4(2) = -4 + 8 = 4$$

- b) Find the domain and range of $f(x)$

a) (2, 4)

- c) Find the Axis of Symmetry.

- d) How does $f(x)$ open?

b) Domain: \mathbb{R}

Range: $(-\infty, 4]$

c) $x = 2$

d) down

e) Does it have a minimum or maximum?
What is that maximum or minimum value?

e) max
4

f) Find the x-intercept(s). $y=0$

$$-x^2 + 4x = 0$$

$$-x(x-4) = 0$$

$$0 \quad 4$$

f) (0, 0) (4, 0)

g) Find the y-intercept. $x=0$

$$-0^2 + 4(0) = 0$$

g) (0, 0)

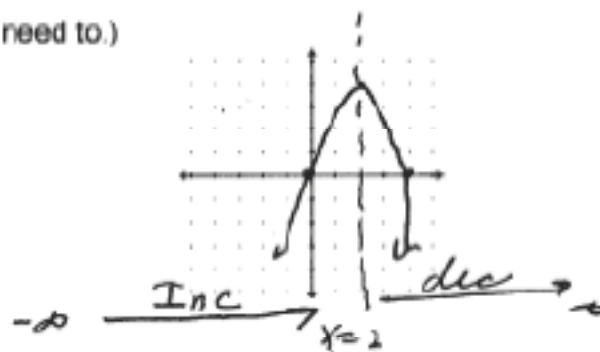
h) Where is f(x) increasing?

h) $(-\infty, 2)$

i) Where is f(x) decreasing?

i) $(2, \infty)$

j) Graph f(x) (Scale your graph paper if you need to.)



6. The owner of a video store has determined that the profits P of the store are approximately given by $P(x) = -x^2 + 80x + 66$, where x is the number of videos rented daily. Find the maximum profit to the nearest dollar.

$$x_v = -\frac{b}{2a} = \frac{-80}{2(-1)} = 40$$

Maximum Profit:

\$1666

$$y_v = P(40) = -(40)^2 + 80(40) + 66$$

$$= \$1666$$

Section 2.7

7. Find the complex zeros of the following quadratic function:

$$g(x) = x^2 + 6x + 13$$

use Quadratic formula
 $a=1$ $b=6$ $c=13$

$$x = -3 \pm 2i$$

$$x = \frac{-6 \pm \sqrt{6^2 - 4(1)(13)}}{2(1)}$$

$$x = \frac{-6 \pm \sqrt{-16}}{2}$$

$$x = \frac{-6 \pm 4i}{2}$$

$$x = \frac{-6 \pm \sqrt{36 - 42}}{2}$$

$$x = \frac{-6}{2} \pm \frac{4i}{2}$$

$$x = -3 \pm 2i$$

8. Determine the character of the solutions of a quadratic equation using the **discriminate**.

$$3x^2 - 8x + 7 = 0$$

Circle your answer

Work:

$$a=3 \quad b=-8 \quad c=7$$

a) 2 real solutions

b) 1 real solution

c) 2 imaginary solutions

$$b^2 = 4ac$$

$$(-8)^2 - 4(3)(7)$$

$$64 - 84 < 0$$

Section 2.6

9. Use a graphing calculator to find the quadratic function of best fit.

Southern Granite and Marble sells granite and marble by the square yard. One of its granite patterns is price sensitive. If the price is too low, customers perceive that it has less quality. If the price is too high, customers perceive that it is overpriced. The company conducted a pricing test with potential customers. The following data was collected.

Price, x	Buyers, B
\$20	30
\$30	50
\$40	65
\$60	75
\$80	72
\$100	50
\$110	25

- a. Use your calculator to find a **quadratic** function that best fits the data.

$$y = -0.024x^2 + 3.115x - 22.126$$

- b. What is the correlation coefficient (state to 5 decimal places) and how good is the fit. .99572

has 2, 9's may be OK.

- c. At what price will the number of buyers be a maximum?

\$64.90

$$x_v = \frac{-b}{2a} = \frac{-3.115}{2(-0.024)} = 64.90$$

- d. What is the maximum number of buyers?

78 buyers

$$y_v = -0.024(64.90)^2 + 3.115(64.90) - 22.126 = 78 \text{ buyers}$$

- e. How many buyers would you have when the price is \$90? $x=90$

63 buyers

$$y = -0.024(90)^2 + 3.115(90) - 22.126 = 63 \text{ buyers}$$

- f. What would the price(s) have to be to have 55 buyers?

$$-0.024x^2 + 3.115x - 22.126 = 55$$

$$-0.024x^2 + 3.115x - 77.126 = 0 \quad \text{use quadratic formula}$$

$$x = \frac{-3.115 \pm \sqrt{(3.115)^2 - 4(-0.024)(-77.126)}}{2(-0.024)}$$

$$\Rightarrow x = \$33.31 \text{ and } x = \$96.49$$