

## ASSIGNMENT 13

DYLAN ZWICK'S MATH 1010 CLASS

### 1. SECTION 8.3

In Exercises 1-4, write the quadratic equation in general form.

**8.3.1:**  $2x^2 = 7 - 2x$

**8.3.2:**  $7x^2 + 15x = 5$

**8.3.4:**  $x(2x + 9) = 12$

In Exercises 5-14, solve the equation first by using the quadratic formula and then by factoring. See Examples 1-4.

**8.3.5:**  $x^2 - 11x + 28 = 0$

**8.3.7:**  $x^2 + 6x + 8 = 0$

**8.3.8:**  $x^2 + 9x + 14 = 0$

**8.3.9:**  $16x^2 + 8x + 1 = 0$

In Exercises 15-40, solve the equation by using the quadratic formula. (Find all real and complex solutions)

**8.3.15:**  $x^2 - 2x - 4 = 0$

**8.3.18:**  $y^2 + 6y - 8 = 0$

**8.3.21:**  $2x^2 + 3x + 3 = 0$

**8.3.25:**  $2x^2 + 4x - 3 = 0$

**8.3.27:**  $-4x^2 - 6x + 3 = 0$

**8.3.30:**  $6x^2 + 3x - 9 = 0$

**8.3.35:**  $2x - 3x^2 = 3 - 7x^2$

In Exercises 41, 49, use the discriminant to determine the type of solution(s) of the quadratic equation. See Example 5.

**8.3.41:**  $x^2 + x + 1 = 0$

**8.3.45:**  $9x^2 - 24x + 16 = 0$

In Exercises 49, 55, solve the quadratic equation by using the most convenient method. (Find all real and complex solutions.)

**8.3.49:**  $z^2 - 169 = 0$

**8.3.55:**  $2y(y - 18) + 3(y - 18) = 0$

In Exercises 65, 69, write a quadratic equation having the given solutions. See Example 6.

**8.3.65:**  $5, -2$

**8.3.69:**  $1 + \sqrt{2}, 1 - \sqrt{2}$

In Exercises 89, 92, solve the equation.

**8.3.89:**  $\frac{x^2}{4} - \frac{2x}{3} = 1$

**8.3.92:**  $\sqrt{2x - 3} = x - 2$

**8.3.100:** The path of a baseball after it has been hit is given by

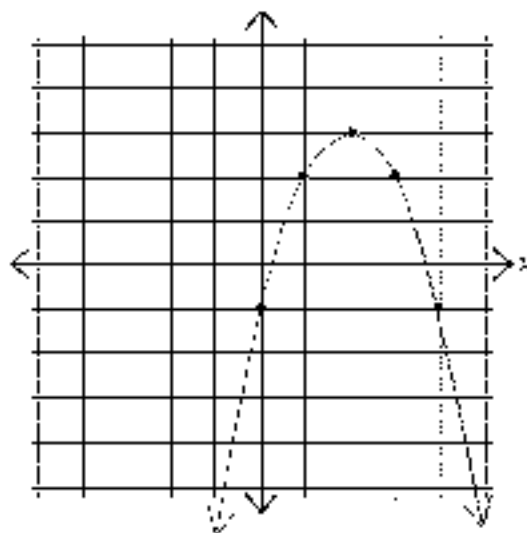
$$h = -0.003x^2 + 1.19x + 5.2$$

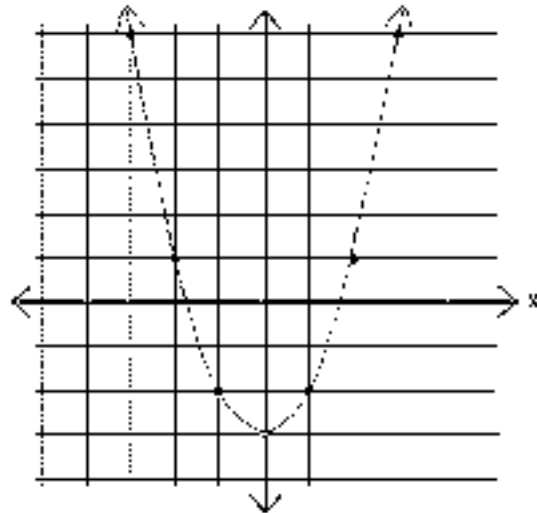
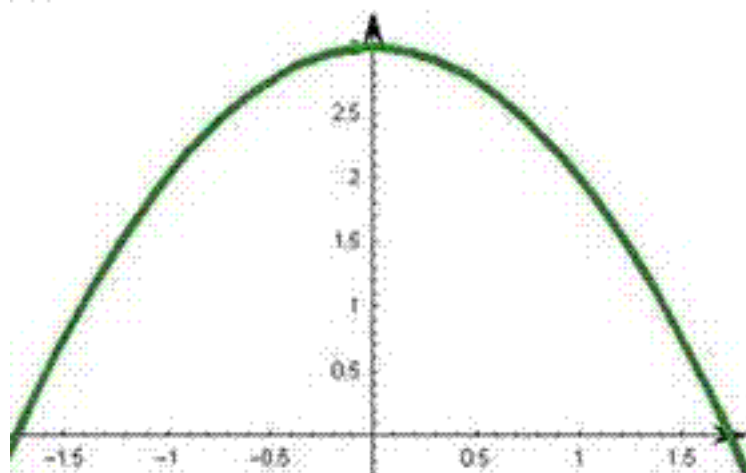
where  $h$  is the height (in feet) of the baseball and  $x$  is the horizontal distance (in feet) of the ball from home plate. The ball hits the top of the outfield fence that is 10 feet high. How far is the outfield fence from home plate?

2. SECTION 8.4

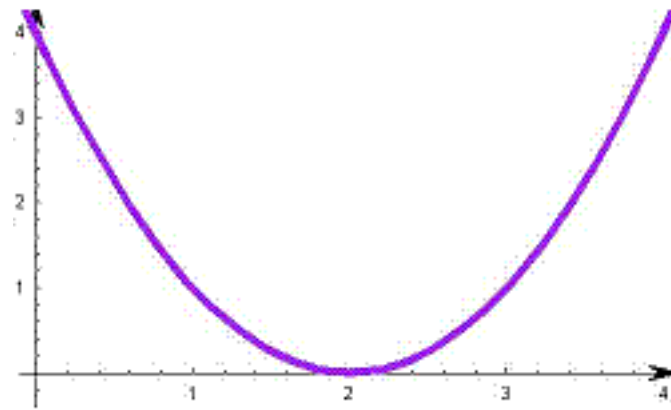
In Exercises 1-6, match the equation with its graph.

**(a)**

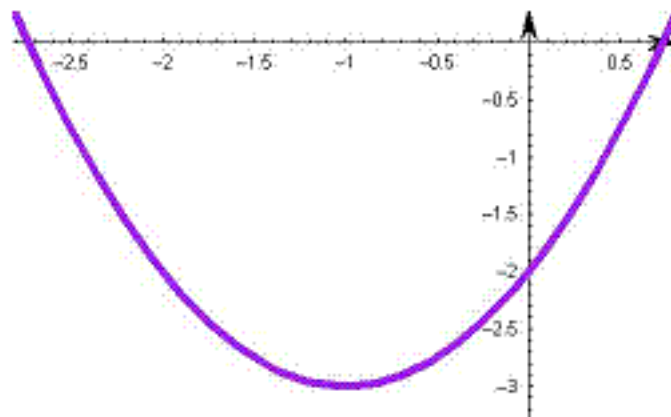


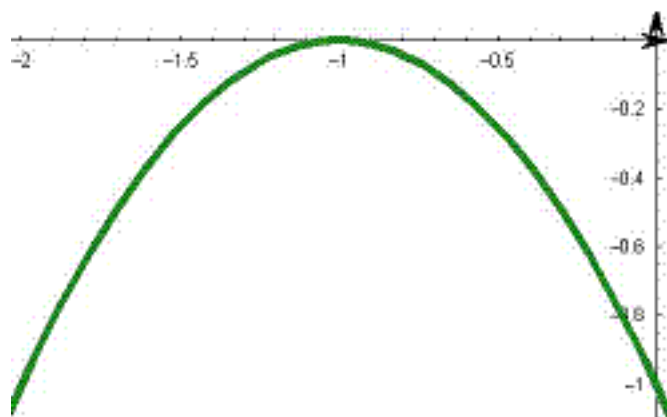
**(b)****(c)**

(d)



(e)



**(f)**

**8.4.1:**  $y = (x + 1)^2 - 3$

**8.4.2:**  $y = -(x + 1)^2$

**8.4.3:**  $y = x^2 - 3$

**8.4.4:**  $y = -x^2 - 3$

**8.4.5:**  $y = (x - 2)^2$

**8.4.6:**  $y = 2 - (x - 2)^2$

In Exercises 7-18, write the equation of the parabola in standard form and find the vertex of its graph. See Example 1.

**8.4.7:**  $y = x^2 - 2x$

**8.4.9:**  $y = x^2 - 4x + 7$



$$\mathbf{8.4.12:} \quad y = x^2 - 4x + 5$$

$$\mathbf{8.4.15:} \quad y = -x^2 - 8x + 5$$

In Exercises 19, 22, find the vertex of the graph of the function by using the formula  $x = -\frac{b}{2a}$ . See example 2.

$$\mathbf{8.4.19:} \quad f(x) = x^2 - 8x + 15$$

$$\mathbf{8.4.22:} \quad h(x) = -x^2 + 14x - 14$$

In Exercises 25-34, state whether the graph opens upward or downward, and find the vertex.

$$\mathbf{8.4.25:} \quad y = 2(x - 0)^2 + 2$$

$$\mathbf{8.4.28:} \quad y = 2(x - 12)^2 + 3$$

$$\mathbf{8.4.30:} \quad y = -(x + 1)^2$$

In Exercises 35-46, find the x- and y-intercepts of the graph.

$$\mathbf{8.4.35:} \quad y = 25 - x^2$$

$$\mathbf{8.4.39:} \quad y = -x^2 - 6x + 7$$

$$\mathbf{8.4.44:} \quad y = x^2 - 3x - 10$$

In Exercises 47-70, sketch the parabola. Identify the vertex and any x-intercepts. Use a graphing calculator to verify your results.

$$\mathbf{8.4.47:} \quad g(x) = x^2 - 4$$

**8.4.51:**  $f(x) = x^2 - 3x$

**8.4.69:**  $f(x) = 5 - \frac{1}{3}x^2$

In Exercises 71, 74, identify the transformation of the graph of  $f(x) = x^2$ , and sketch a graph of h.

**8.4.71:**  $h(x) = x^2 - 1$

**8.4.74:**  $h(x) = (x - 4)^2$

**8.4.100:** *Path of a Softball.* The height  $y$  (in feet) of a softball that you hit is given by

$$y = -\frac{1}{70}x^2 + 2x + 2$$

where  $x$  is the horizontal distance (in feet) from where you hit the ball.

(a) How high is the ball when you hit it?

- (b) How high is the ball at its maximum height?
- (c) How far from where you hit the ball does it strike the ground?

## 3. SECTION 8.5

**8.5.1:** A store owner bought a case of eggs for \$21.60. By the time all but 6 dozen of the eggs had been sold at a profit of \$0.30 per dozen, the original investment of \$21.60 had been regained. How many dozen eggs did the owner sell , and what was the selling price per dozen?

**8.5.3:** A flea market vendor buys a box of DVD movies for \$50. After selling several of the DVDs at a profit of \$3 each, the vendor still has 15 of the DVDs left by the time she regains her \$50 investment. How many DVDs has the vendor sold, and at what price?

**8.5.4:** A sorority buys a case of sweatshirts for \$750 to sell at a mixer. The sorority needs to sell all but 20 of the sweatshirts at a profit of \$10 per sweatshirt to regain the \$750 investment. How many sweatshirts must be sold, and at what price, to do this?

In Exercises 5, 11, complete the table of widths, lengths, perimeters, and areas of rectangles.

	Width	Length	Perimeter	Area
<b>8.5.5, 11:</b>	$1.4l$	$l$	$54in.$	
	$w$	$w + 3$	$54km$	

**8.5.15:** A picture frame is 4 inches taller than it is wide and has an area of 192 square inches. What are the dimensions of the picture frame?

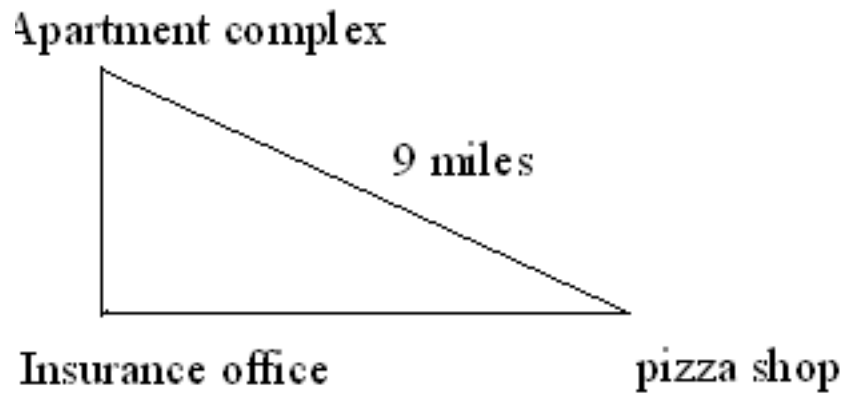
**8.5.20:** You have 100 feet of fencing. Do you have enough to enclose a rectangular region whose area is 630 square feet? Is there enough to enclose a circular area of 630 square feet? Explain.

In Exercises 23, 25 find the interest rate  $r$ . Use the formula  $A = P(1 + r)^2$ , where  $A$  is the amount after 2 years in an account earning  $r$  percent (in decimal form) compounded annually, and  $P$  is the original investment.

**8.5.23:**  $P = \$10,000$ ,  $A = \$11,990.25$

**8.5.25:**  $P = \$500$ ,  $A = \$572.45$

**8.5.29:** A service organization pays \$210 for a block of tickets to a baseball game. The block contains three more tickets than the organization needs for its members. By inviting three more people to attend (and share in the cost), the organization lowers the price per person by \$3.50. How many people are going to the game?



**8.5.31:** *Delivery Rate.* You deliver pizzas to an insurance office and an apartment complex (see figure). Your total mileage in derving to the insurance office and then to the apartment complex is 12 miles. By using a direct route, you are able to drive just 9 miles to teturn to the pizza shop. Estimate the distance from the pizza shop to the insurance office.

**8.5.35:** An office contains two printers. Machine B is known to take 3 minutes longer than machine A to produce the company's monthly financial report. Using both machines together, it takes 6 minutes to produce the report. How long would it take each machine to produce the report?

**8.5.41:** The height  $h$  in feet of a baseball  $t$  seconds after being hit at a point 3 feet above the ground is given by  $h = 3 + 75t - 16t^2$ . Find the time when the ball hits the ground.

**8.5.49:** Find two consecutive odd integers such that their product is 323.

## 4. SECTION 8.6

In Exercises 1-10, find the critical numbers.

**8.6.1:**  $x(2x - 5)$

**8.6.2:**  $5x(x - 3)$

**8.6.6:**  $y(y - 4) - 3(y - 4)$

**8.6.10:**  $4x^2 - 4x - 3$

In Exercises 11-20, determine the intervals for which the polynomial is entirely negative and entirely positive.

**8.6.11:**  $x - 4$

**8.6.15:**  $4x(x - 5)$

**8.6.20:**  $2x^2 - 4x - 3$

In Exercises 21-60, solve the inequality and graph the solution on the real number line. (Some of the inequalities have no solutions).

**8.6.21:**  $3x(x - 2) < 0$



**8.6.24:**  $5x(8 - x) > 0$

**8.6.28:**  $x^2 + 8x + 7 < 0$

**8.6.30:**  $x^2 - 5x \geq 0$

**8.6.31:**  $x^2 + 5x \leq 36$

**8.6.33:**  $u^2 + 2u - 2 > 1$

**8.6.35:**  $x^2 + 4x + 5 < 0$

**8.6.39:**  $x^2 - 4x + 2 > 0$

**8.6.44:**  $y^2 + 16y + 64 \leq 0$

**8.6.49:**  $-2u^2 + 7u + 4 < 0$

**8.6.55:**  $6 - (x - 2)^2 < 0$

In Exercises 73, 76, find the critical numbers.

**8.6.73:**  $\frac{5}{x - 3}$

**8.6.76:**  $\frac{x - 2}{x - 10}$

In Exercises 77-98, solve the inequality and graph the solution on the real number line.

**8.6.77:**  $\frac{5}{x - 3} > 0$

**8.6.80:**  $\frac{-3}{4 - x} > 0$

**8.6.81:**  $\frac{3}{y - 1} \leq -1$

$$\mathbf{8.6.85:} \quad \frac{y-4}{y-1} \leq 0$$

$$\mathbf{8.6.95:} \quad \frac{4x}{x+2} < -1$$

In Exercises 102, 104, use a graphing calculator to solve the rational inequality. Verify your result algebraically.

$$\mathbf{8.6.102:} \quad \frac{x+12}{x+2} - 3 \geq 0$$

$$\mathbf{8.6.104:} \quad \frac{3x-4}{x-4} < -5$$

In Exercises 107, use a graphing calculator to graph the function. Use the graph to approximate the values of  $x$  that satisfy the specified inequalities.

$$\mathbf{8.6.107:} \quad f(x) = \frac{3x}{x-2}, \text{ (a) } f(x) \leq 0 \text{ (b) } f(x) \geq 6$$