

Chapter 2

POLYNOMIAL FUNCTIONS

Polynomial Function

- A function given by:

$$f(x) = a_n x^n + a_{n-1} x^{n-1} + \dots + a_2 x^2 + a_1 x^1 + a_0$$

Example:

$$f(x) = x^5 + 5x^4 - 3x^3 + 7x^2 - 10x + 8$$

DEGREE

- The highest exponent value of a function
- Examples:
 - 1.) $f(x) = 3x^2 - 7x + 18$
 - 2.) $f(x) = x^5 + 5x^4 - 3x^3 + 7x^2 - 10x + 8$
 - 3.) $g(x) = 3x + 5x^6 - 3x^2 + 7$
 - 4.) $h(x) = 6x - 6$
 - 5.) $j(x) = 5$

Quadratic Function

- A function given by: $f(x) = ax^2 + bx + c$, where a , b , and c are real numbers and $a \neq 0$
- Graph is called a parabola
- Graph is symmetric with respect to the axis of symmetry
- Vertex- point where the graph intersects the axis of symmetry
- Show graph on board

Quadratic Functions

- If “ a ” is positive, the parabola opens up (vertex is a minimum)
- If “ a ” is negative, the parabola opens down (vertex is a maximum)

Standard Form: $f(x) = ax^2 + bx + c$

To find the Vertex:

- 1.) x value of vertex is
 $x = -b/2a$
- 2.) Plug in x-value in
function to find y
- 3.) Vertex is:
 $(-b/2a, f(-b/2a))$

To Find the x-intercepts:

- 1.) Set function = 0
- 2.) Solve for x:
 - factor
 - set = 0 and solve
 - quadratic formula

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Examples- Graph

$$a = -1$$

$$b = -4$$

$$c = 21$$

$$1.) y = x^2 - 6x + 8$$

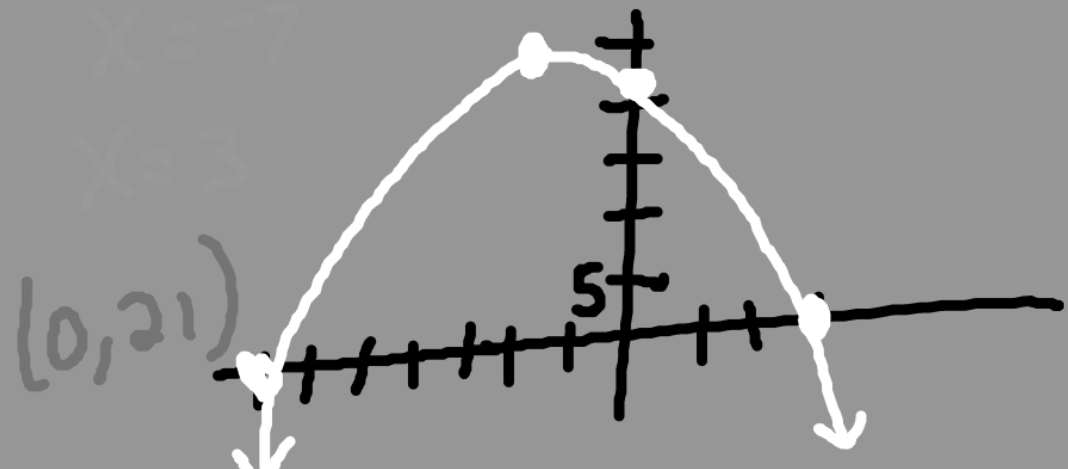
$$x = \frac{-b}{2a} = \frac{4}{-2} = -2$$

$$y = -(-2)^2 - 4(-2) + 21$$
$$= -4 + 8 + 21$$

$$= 25$$

$$V(-2, 25)$$

$$2.) f(x) = -x^2 - 4x + 21$$



Examples- Graph

$$a=1$$

$$b=4$$

$$c=2$$

$$3.) f(x) = 2x^2 + 4x - 3$$

$$4.) f(x) = x^2 + 4x + 2$$

$$x = \frac{-b}{2a} = -2$$

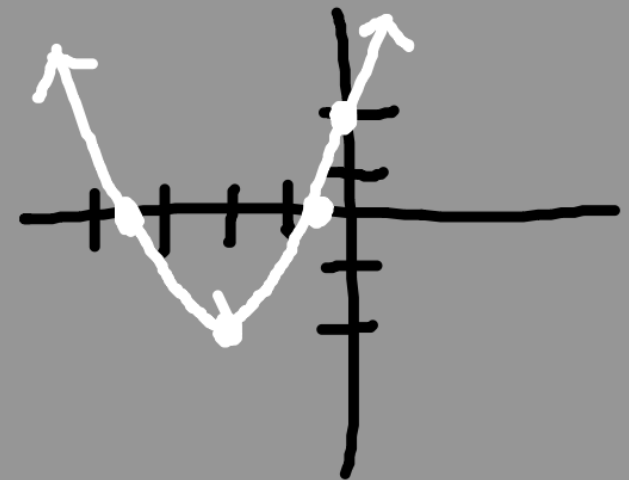
$$y = (-2)^2 + 4(-2) + 2$$

$$y = 4 - 8 + 2$$

$$y = -2$$

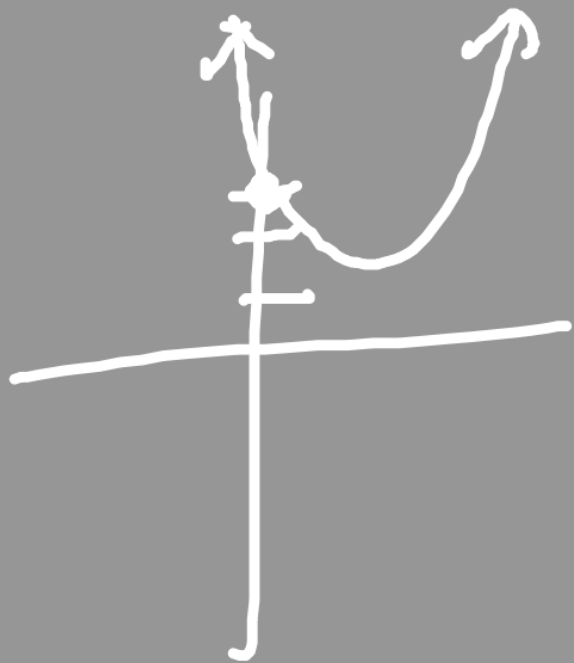
$$v(-2, -2)$$

$$y\text{-int}^+(0, 2)$$



Examples- Graph

5.) $f(x) = x^2 - 7$



6.) $f(x) = x^2 + 2x + 3$

$$x^2 + 2x + 3 = 0$$

$$x = \frac{-2 \pm \sqrt{4 - 4 \cdot 1 \cdot 3}}{2}$$

$$x = \frac{-2 \pm \sqrt{-8}}{2} = \frac{-2 \pm 2i\sqrt{2}}{2} \\ = -1 \pm i\sqrt{2}$$

Examples- Graph

7.) $f(x) = x^2 + 4x + 4$

Write the equation of parabola

- Use: $f(x) = a(x - h)^2 + k$
 - where (h, k) is the vertex
 - Plug in (h, k) and (x, y) to find “a”
 - Plug in a, h , and k

Examples

1.) $V(1, 2)$, pt $(0, 0)$

2.) $V(2, -3)$ pt $(1, 4)$

Examples

3.) $V(-2, 5)$ pt $(3, -2)$

Textbook

- Pg 133 examples # 5, # 6
- Pg 136 # 78-79

Hmwk

- Pg 135 # 13-16, 18-20, 23-25, 34, 43-46, 77, 80