

# Chapter 2

## Polynomials

D :  $(-\infty, \infty)$

Smooth turns ; no sharp turns

| Polynomial      | Not a Polynomial  |
|-----------------|-------------------|
| $5x^3 - 8x + 1$ | $\sqrt{x^2 + 5}$  |
| $-x - 6$        | $\frac{2}{x - 3}$ |
| -3              | $ 7x $            |
| $9x^{-3} + 4$   |                   |

## Degree of a Polynomial

### Leading Coefficient

### Standard Form

$$1.) f(x) = 8x^5 - 3x^4 - x^2 + 5$$

Standard Form:  $8x^5 - 3x^4 - x^2 + 5$

Degree: 5

LC: 8

$$2.) g(x) = 9 - x^2 + x - 2x^3$$

Standard Form:  $-2x^3 - x^2 + x + 9$

Degree: 3

LC: -2

Write an equation for the linear function  $f$  if

$$f(4) = -2 \quad \text{and} \quad f(7) = 4$$

$$y = \underset{\text{Slope}}{\uparrow} mx + b \quad \underset{y\text{-int.}}{\uparrow}$$

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$\boxed{y = 2x - 10}$$

$$y - y_1 = m(x - x_1)$$

$$(4, -2), (7, 4)$$

$$m = \frac{4 - -2}{7 - 4} = \frac{6}{3} = 2$$

$$y = mx + b$$

$$-2 = 2(4) + b$$

$$-2 = 8 + b$$

$$-10 = b$$

## Quadratic Functions

### Standard Form

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

$$\text{Vertex: } \left( \frac{-b}{2a}, f\left(\frac{-b}{2a}\right) \right)$$

$$\text{Axis of Symmetry: } x = \frac{-b}{2a}$$

### Vertex Form

$$f(x) = a(x - h)^2 + k$$

$$\text{Vertex: } (h, k)$$

$$\text{Axis of Symmetry: } x = h$$

$$x = \frac{-b}{2a} = \frac{-(-8)}{2(-4)} = \frac{8}{-8} = -1 \rightarrow -4(-1)^2 - 8(-1) + 3 \\ -4 + 8 + 3$$

Vertex:  $(-1, 7)$

Axis of Symmetry:  $x = -1$

Vertex Form:  $y = -4(x + 1)^2 + 7$

Write an equation of a quadratic function in vertex form if the vertex is  $(-3, 5)$  and goes through the point  $(2, -8)$ .

$$\begin{aligned} y &= a(x - h)^2 + k \\ y &= a(x + 3)^2 + 5 \\ -8 &= a(2 + 3)^2 + 5 \\ -8 &= a(5)^2 + 5 \\ -8 &= a(25) + 5 \\ -13 &= a(25) \\ -\frac{13}{25} &= a \end{aligned}$$

$$y = -\frac{13}{25}(x + 3)^2 + 5$$

# Homework

pg. 169: 1-6, 7, 9, 13-18, 23, 29, 30, 39, 43