

1.  $f(x) = 3x^3 - 7x^2 + x^4 + 2x$

Standard form  $f(x) = x^4 + 3x^3 - 7x^2 + 2x$  Leading Coefficient 1, positive Degree 4, even# of Zeros 4 Classify by degree Quartic Classify by terms PolynomialEnd Behavior: as  $x \rightarrow +\infty, f(x) \rightarrow \infty$  as  $x \rightarrow -\infty, f(x) \rightarrow \infty$  # of Turns 3

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

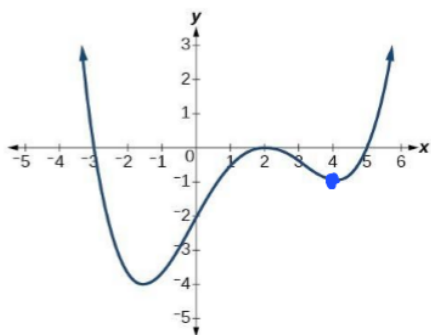
Standard form  $f(x) = -2x^3 - x^2 + 5x$  Leading Coefficient -2, neg. Degree 3, odd# of Zeros 3 Classify by degree Cubic Classify by terms TrinomialEnd Behavior: as  $x \rightarrow +\infty, f(x) \rightarrow -\infty$  as  $x \rightarrow -\infty, f(x) \rightarrow \infty$  # of Turns 2

3.  $f(x) = 5x$

Standard form  $f(x) = 5x$  Leading Coefficient 5, pos. Degree 1, odd# of Zeros 1 Classify by degree Linear Classify by terms monomialEnd Behavior: as  $x \rightarrow +\infty, f(x) \rightarrow \infty$  as  $x \rightarrow -\infty, f(x) \rightarrow -\infty$  # of Turns 0

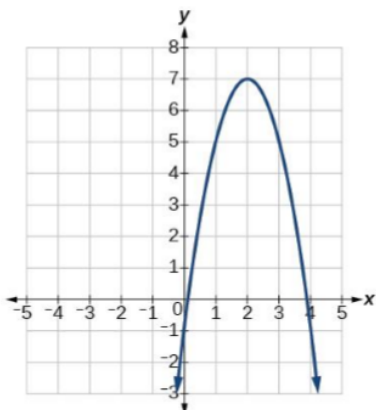
4.  $f(x) = 4x - 7x^2 + 11$

Standard form  $-7x^2 + 4x + 11$  Leading Coefficient -7, neg. Degree 2, even# of Zeros 2 Classify by degree Quadratic Classify by terms trinomialEnd Behavior: as  $x \rightarrow +\infty, f(x) \rightarrow -\infty$  as  $x \rightarrow -\infty, f(x) \rightarrow -\infty$  # of Turns 1



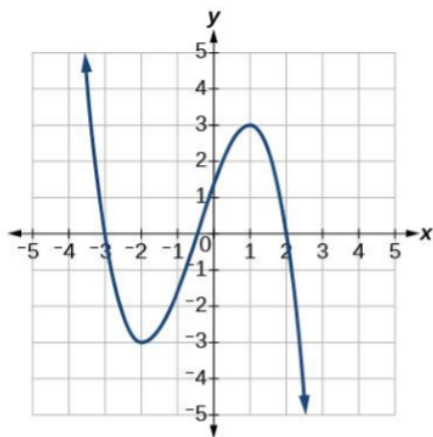
Domain  $(-\infty, \infty)$   
 Range  $[-4, \infty)$   
 Zeros  $(-3, 0), (2, 0), (5, 0)$   
 y-int  $(0, -2)$   
 # of Extrema 3  
 Rel. Max  $(2, 0)$   
 Rel. Min  $(-1.5, -4)$

Abs. Max None  
 Abs. Min  $(-1.5, -4)$   
 Int. of Inc.  $(-1.5, 2) \cup (4, \infty)$   
 Int. of Dec.  $(-\infty, -1.5) \cup (2, 4)$   
 End Behavior:  
 as  $x \rightarrow +\infty, f(x) \rightarrow \infty$   
 as  $x \rightarrow -\infty, f(x) \rightarrow \infty$



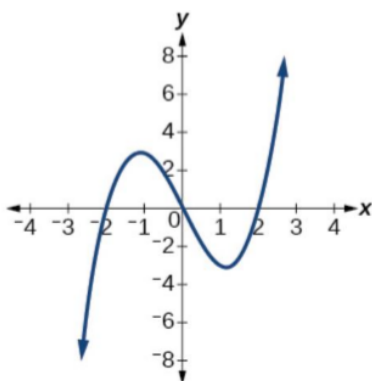
Domain  $(-\infty, \infty)$   
 Range  $(-\infty, 7]$   
 Zeros  $(0, 1), (3, 0)$   
 y-int  $(0, 1)$   
 # of Extrema 1  
 Rel. Max None  
 Rel. Min None

Abs. Max  $(2, 7)$   
 Abs. Min None  
 Int. of Inc.  $(-\infty, 2)$   
 Int. of Dec.  $(2, \infty)$   
 End Behavior:  
 as  $x \rightarrow +\infty, f(x) \rightarrow -\infty$   
 as  $x \rightarrow -\infty, f(x) \rightarrow -\infty$



Domain  $(-\infty, \infty)$   
 Range  $(-\infty, \infty)$   
 Zeros  $(-3, 0), (0.5, 0), (2, 0)$   
 y-int  $(0, 1.3)$   
 # of Extrema 2  
 Rel. Max  $(1, 3)$   
 Rel. Min  $(-2, -3)$

Abs. Max None  
 Abs. Min None  
 Int. of Inc.  $(-2, 1)$   
 Int. of Dec.  $(-\infty, -2) \cup (1, \infty)$   
 End Behavior:  
 as  $x \rightarrow +\infty, f(x) \rightarrow -\infty$   
 as  $x \rightarrow -\infty, f(x) \rightarrow \infty$



Domain  $(-\infty, \infty)$   
 Range  $(-\infty, \infty)$   
 Zeros  $(-2, 0), (0, 0), (2, 0)$   
 y-int  $(0, 0)$   
 # of Extrema 2  
 Rel. Max  $(-1, 3)$   
 Rel. Min  $(1, -3)$

Abs. Max None  
 Abs. Min None  
 Int. of Inc.  $(-\infty, -1) \cup (1, \infty)$   
 Int. of Dec.  $(-1, 1)$   
 End Behavior:  
 as  $x \rightarrow +\infty, f(x) \rightarrow \infty$   
 as  $x \rightarrow -\infty, f(x) \rightarrow -\infty$

## Function Operations

Perform the indicated operation.

1)  $g(a) = a^3 - 2a$

$f(a) = 3a - 1$

Find  $g(a) + f(a)$ 

$$a^3 - 2a + (3a - 1)$$

$$a^3 + a - 1$$

3)  $g(t) = t^3 + 3$

$h(t) = t - 4$

Find  $g(t) - h(t)$ 

$$t^3 + 3 - (t - 4)$$

$$t^3 + 3 - t + 4$$

$$t^3 - t + 7$$

5)  $f(x) = -x - 2$

$g(x) = -2x + 1$

Find  $f(g(x))$ 

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

$$2x - 1 - 2$$

$$2x - 3$$

7)  $h(x) = x^2 - 2$

$g(x) = 4x - 2$

Find  $h(-3) \div g(-3)$ 

$$h(-3) = (-3)^2 - 2 = 7$$

$$g(-3) = 4(-3) - 2 = -14$$

$$\frac{7}{-14} = -\frac{1}{2}$$

9)  $f(x) = 2x - 1$

$g(x) = 3x + 2$

Find  $f(8) - g(8)$ 

$$f(8) = 2(8) - 1 = 15$$

$$g(8) = 3(8) + 2 = 26$$

$$15 - 26 = -11$$

11)  $f(x) = -2x - 1$

$g(x) = x^2 - 3x$

Find  $f(g(8))$ 

$$g(8) = (8)^2 - 3(8) = 40$$

$$f(40) = -2(40) - 1 = -81$$

2)  $h(n) = 4n - 5$

$g(n) = 2n + 4$

Find  $h(n) \cdot g(n)$ 

$$(4n - 5)(2n + 4)$$

$$8n^2 + 16n - 10n - 20$$

$$8n^2 + 6n - 20$$

4)  $h(n) = n^2 + 3$

$g(n) = n - 3$

Find  $h(g(n))$ 

$$(n - 3)^2 + 3$$

$$n^2 - 6n + 9 + 3$$

$$n^2 - 6n + 12$$

6)  $g(x) = 4x - 1$

$h(x) = x^2 + 1$

Find  $g(x) \div h(x)$ 

$$\frac{4x - 1}{x^2 + 1}$$

8)  $f(a) = a^2 - 3a$

$g(a) = a + 4$

Find  $f(-3) + g(-3)$ 

$$f(-3) = (-3)^2 - 3(-3) = 18$$

$$g(-3) = (-3) + 4 = 1$$

$$18 + 1 = 19$$

10)  $f(x) = 4x$

$g(x) = 2x + 2$

Find  $f(g(-5))$ 

$$g(-5) = 2(-5) + 2 = -8$$

$$f(-8) = 4(-8) = -32$$

12)  $f(x) = 2x - 1$

$g(x) = 3x^2 + 2$

Find  $f(3) \cdot g(3)$ 

$$f(3) = 2(3) - 1 = 5$$

$$g(3) = 3(3)^2 + 2 = 29$$

$$5 \cdot 29 = 145$$