



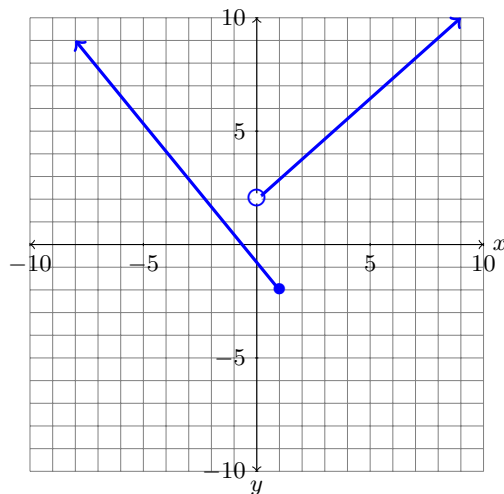
SECTION 5.1: RELATIONS AND FUNCTIONS

Pr 1. State the inputs and outputs of $R_1 = \{(10, -23), (-8, 41), (-12, 41), (36, 36)\}$

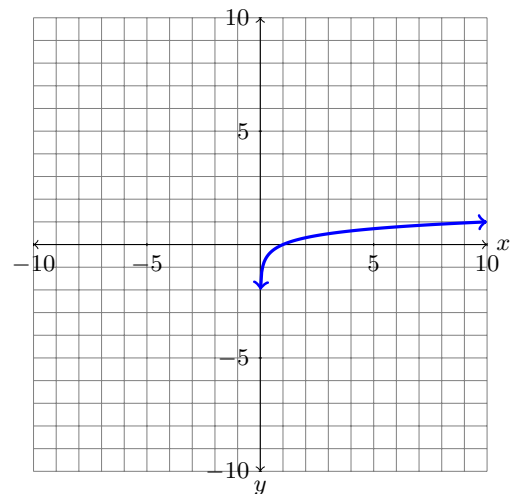
Pr 2. Determine if the given relation is a function. If the relation is a function, state the domain and range of the function.

(a) $2x + y = 10$

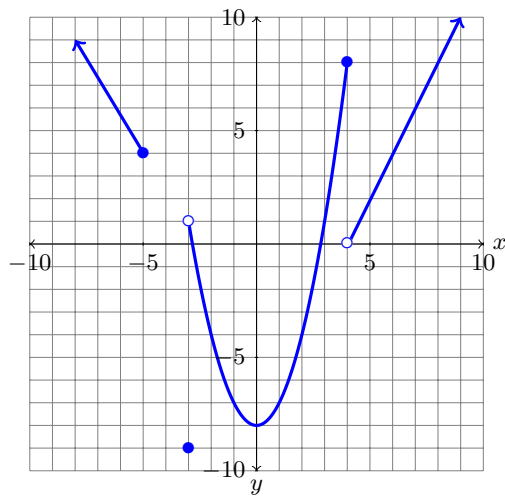
(b)



(c)



Pr 3. Use the graph of $g(x)$ below to answer each of the following.



(a) $g(-4)$

(b) $g(1)$

(c) $g(4)$

(d) $g(-5)$

(e) $g(x) = 1$

(f) $g(x) = -8$

(g) $g(x) = -9$

(h) State the domain of $g(x)$.

(i) State the range of $g(x)$.

Pr 4. Use the function $f(x) = 4 - 5x$ to compute and expand and simplify each of the following.

(a) $f(3q)$

(b) $f(x - 10)$

(c) $f(x) - f(10)$

Pr 5. Use the function $g(x) = 8x^2 - 9x$ to compute and expand and simplify each of the following.

(a) $g(-4)$

(b) $g(x + h)$

(c) $g(x + h) - g(x)$

SECTION 5.2 POLYNOMIAL FUNCTIONS

Pr 1. Determine if the given function is a polynomial function. If the answer is yes, state the degree, leading coefficient, and constant term.

(a) $f(x) = -40x + 4x^3 - 6x^{3.8}$

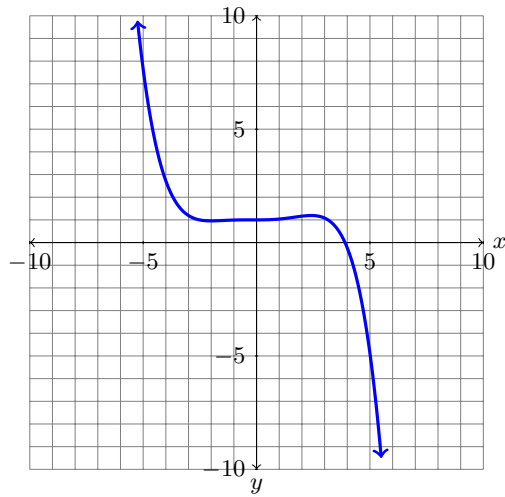
(b) $g(w) = 3w^2 - w^3 + 7w - \sqrt{21}$

Pr 2. Describe the end behavior of each polynomial function, both symbolically and with a quick sketch of the end behavior.

(a) $f(x) = -3x^4 + 3x^3 - 16x - 8^5$

(b) $g(x) = 12x^4 - 9 + 18x^7 - x^2$

Pr 3. Describe the end behavior symbolically for the polynomial function, $f(x)$, graphed below.



Pr 4. State the domain of each polynomial function.

(a) $f(x) = 4x^3 - 6x^2 - 40x$

(b) $g(w) = 3w^2 - w^3 + 7w - 21$

Pr 5. Determine all exact real zeros, the x -intercept(s), and y -intercept of each given polynomial function, if possible.

(a) $g(x) = 4x^3 - 6x^2 - 40x = 2x(2x + 5)(x - 4)$

(b) $h(w) = 3w^2 - w^3 + 7w - 21$

(c) $k(x) = (x^2 + 4)(x^2 - 9)$

Pr 6. $h(x) = 49 - 81x^2$

vertex:

axis of symmetry:

domain:

range:

x -intercept(s):

y -intercept:

maximum value:

minimum value:

Pr 7. $j(x) = \frac{1}{5}x^2 + \frac{49}{500}x - \frac{31}{100}$

vertex:

axis of symmetry:

domain:

range:

x -intercept(s):

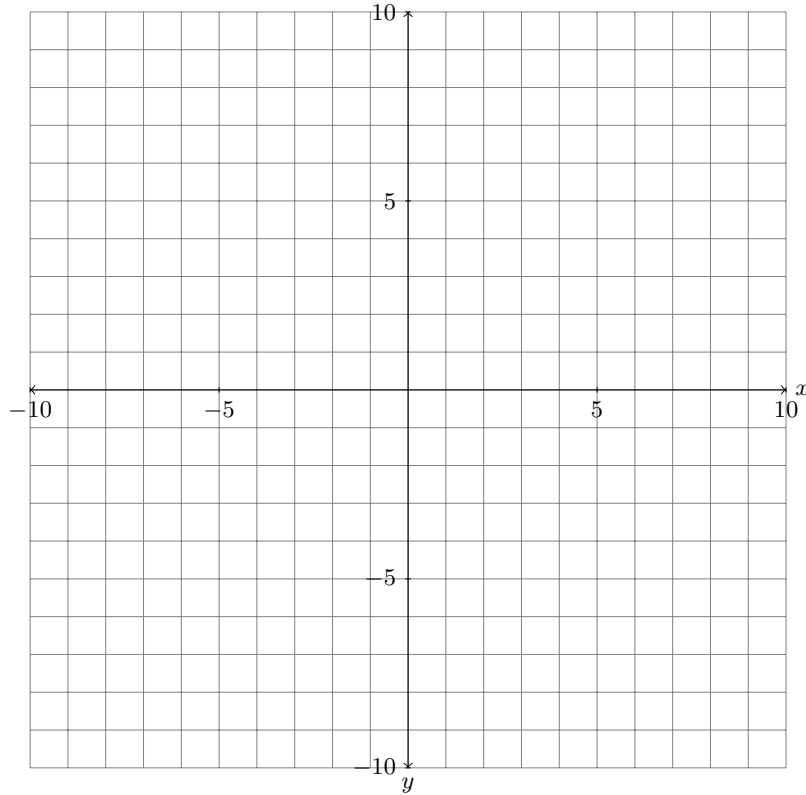
y -intercept:

maximum value:

minimum value:

Pr 8. Graph the quadratic function with the following properties

- i. As $x \rightarrow -\infty$, $h(x) \rightarrow \infty$ and as $x \rightarrow \infty$, $h(x) \rightarrow \infty$
- ii. $h(x)$ has a single real zero of -3 .
- iii. There is a minimum value of 0 .
- iv. The graph has a y -intercept of $(0, 9)$.



Pr 9. Given $R(x) = -10x^2 + 3700x$ and $C(x) = 200x + 66000$, where x is the number of items made and sold, to determine each of the following. Assume both revenue and cost are given in dollars.

i. The number of items sold when revenue is maximized.

ii. The maximum revenue.

iii. The number of items sold when profit is maximized.

iv. The maximum profit.

v. The break-even quantity/quantities.

Pr 10. The cost to produce bottled spring water is given by $C(x) = 16x + 7400$, where x is the number of thousands of bottles produced. The profit from the sale of these bottles is given by the function

$$P(x) = -x^2 + 310x - 7400.$$

(a) How many bottles must be sold to maximize the profit?

(b) What is the maximum profit?

(c) What is the revenue when the profit is maximized?

- Pr 11.** The cost of manufacturing collectible bobble head figurines is given by $C(x) = 60x + 375$, where x is the number of collectible bobble head figurines produced. If each figurine has a price-demand function of $p(x) = -1.6x + 300$, in dollars, determine
- (a) the company's profit function.

(b) how many figurines must be sold in order to maximize revenue?

(c) how many figurines must be sold in order to maximize profit?

(d) at what price per figurine will the maximum profit be achieved?