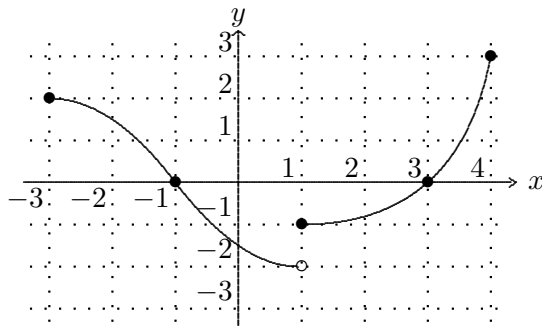




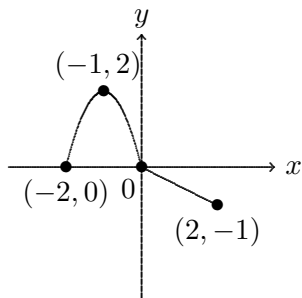
6. Let  $f(x) = 4\sqrt{x} - x + 2$ .
  - a. What is the domain of  $f$ ?
  - b. Use the calculator to help you sketch the graph  $y = f(x)$ . Indicate your scale.
  - c. The function  $f$  has a unique maximum. Estimate its location.
  - d. Use the calculator to solve the inequality  $f(x) > 0$  numerically.
  - e. Estimate all  $x$ - and  $y$ -intercepts of the graph of  $f$ .
7. Express the function  $g(x) = |x| + |x+2|$  as a piecewise defined function without using absolute values. (Hint: where do the definitions change?)
8. The graph of a function  $y = f(x)$  is given below. Use information in the graph to answer parts a through g. Give exact answers where possible, approximations where necessary.



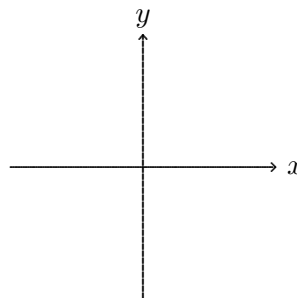
- a. Domain( $f$ ) =
- b. Range( $f$ ) =
- c.  $f(0) =$
- d.  $f(f(1)) =$
- e. Where is  $f(x)$  positive?
- f. Where is  $f(x)$  increasing?
- g. Solve  $f(x) = 1$ .

9. The daily truck rental for agency A is \$21 plus 21 cents per mile. For agency B the rate is \$32 plus 18 cents per mile. A driver plans to take a 320 mile trip. Which agency will give the better rate? Also, determine the minimum number of miles that must be driven beyond which the cost from agency B is lower.
10. The graph of a function  $f$  is given below as part a. Use it to draw the graphs in parts b and c. Indicate clearly the locations of the four points corresponding to the points marked with  $\bullet$  in the original graph.

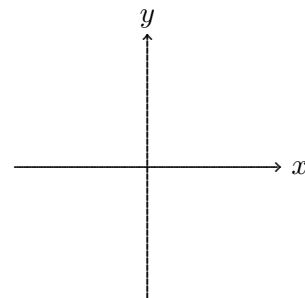
a.  $y = f(x)$



b.  $y = 2 - f(x)$



c.  $y = f(1 - x)$



11. Determine inverses for the following functions:

a.  $f(x) = 3x - 7$

b.  $f(x) = \frac{2x + 3}{x - 4}$

c.  $f(x) = 3 - \sqrt{x + 1}$

12. By using the table of values to the right, find:

a.  $(g \circ f)(1)$

b.  $g(f(g(2)))$

c.  $(f - g)(3)$

d.  $(f \cdot g)(4)$

- e. The average rate of change of  $f(x)$  on  $[1, 3]$ .

$x$	$f(x)$	$g(x)$
1	4	2
2	2	4
3	1	5
4	3	3
5	6	1

ANSWERS

1. a.  $x^2 - 5x + 4$     b.  $6x^3 - 12x^2$     c.  $-2$     d.  $2x - 3 + h$     e.  $\sqrt{x^2 - 3x}$   
 f.  $x - \sqrt{x} - 2$

2. a.  $(-\infty, 0) \cup (0, \infty)$     b.  $(-\infty, \frac{4}{3}]$     c.  $(-\infty, 0) \cup (0, \infty)$     d.  $[-\frac{1}{2}, \frac{2}{3}]$   
 e.  $[-\frac{4}{7}, 0) \cup (0, \infty)$     f.  $(-\infty, 0] \cup [1, \infty)$

3. a.  $1$     b.  $-3$     c.  $x = -\frac{1}{2}$     d.  $-2 \leq x \leq -1$     e.  $[-2, 1) \cup (1, 3)$   
 f.  $(-\infty, -1] \cup [0, 2)$     g. On the intervals  $[-2, -1)$  and  $(1, 3)$

4.  $(2 - a, 3 - b)$

5. a.  $a = g \circ h \circ f$     b.  $b = f \circ g \circ h$     c.  $c = h \circ f \circ g$

6. a.  $[0, \infty)$

b. The graph of  $f$  begins at  $(0, 2)$ , increases to a maximum at  $(4, 6)$ , and then decreases, passing from positive to negative at  $x = 19.798$ .

c.  $(4, 6)$     d.  $0 \leq x < 19.798$     e.  $(0, 2)$  and  $(19.798, 0)$

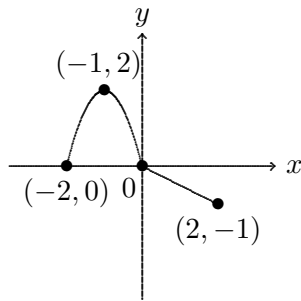
7. 
$$g(x) = \begin{cases} -2x - 2 & x \leq -2 \\ 2 & -2 < x < 0 \\ 2x + 2 & x \geq 0 \end{cases}$$

8. a.  $[-3, 4]$     b.  $(-2, 3]$     c.  $-1.5$     d.  $0$     e.  $[-3, -1) \cup (3, 4]$     f.  $[1, 4]$   
 g.  $x = -1.6$  or  $x = 3.5$

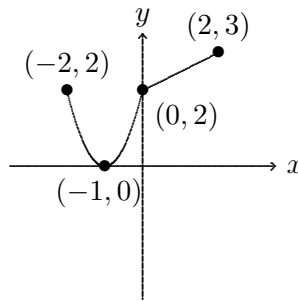
9. The cost for  $x$  miles with agency A is  $a(x) = 21 + 0.21x$  while the cost with agency B is  $b(x) = 32 + 0.18x$ . Because  $a(320) = 88.20$  and  $b(320) = 89.60$ , agency A will be a better deal. However  $a(x) > b(x)$  once  $x \geq 366.7$ .

10.

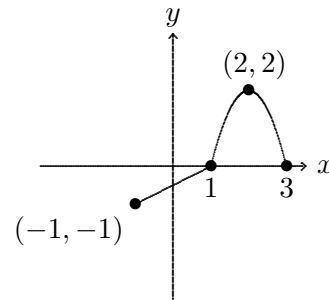
a.  $y = f(x)$



b.  $y = 2 - f(x)$



c.  $y = f(1 - x)$



11. a.  $f^{-1}(y) = \frac{y + 7}{3}$     b.  $f^{-1}(y) = \frac{4y + 3}{y - 2}$     c.  $f^{-1}(y) = y^2 - 6y + 8, y \leq 3$

12. a.  $3$     b.  $5$     c.  $-4$     d.  $9$     e.  $\frac{f(3) - f(1)}{3 - 1} = -\frac{3}{2}$