MULTIPLE CHOICE

1. Find a, such that the function $f(x) = 4x + \sqrt{a - x^2}$ has the domain $(-4, 4)$.

   a. $a = -16$
   b. $a = \sqrt{4}$
   c. $a = -\sqrt{4}$
   d. $a = 16$
   e. $a = 4$

   ANS: D PTS: 1 DIF: Medium REF: 1.1.38
   MSC: Bimodal NOT: Section 1.1

2. Which of the following graphs is neither even nor odd?

   a. $f(x) = \dfrac{5x^2}{x^4 + 1}$

   b. $f(x) = x^3 - 9x$

   c. $f(x) = 4x^3 + 6x^2 + 5$

   ANS: C PTS: 1 DIF: Medium REF: 1.1.78
   MSC: Bimodal NOT: Section 1.1

3. If $f(x) = 4x^2 + 2$, find and simplify $\dfrac{f(1+h) - f(1)}{h}$, where $h \neq 0$.

   a. $8 + 4h$
   b. $4h$
   c. $2 + 4h^2$
   d. $4 + 8h$

   ANS: A PTS: 1 DIF: Easy REF: 1.1.27
   MSC: Bimodal NOT: Section 1.1

4. Find the domain of the function.

   $f(x) = \dfrac{7x + 5}{x^2}$

   a.

   b.

c.

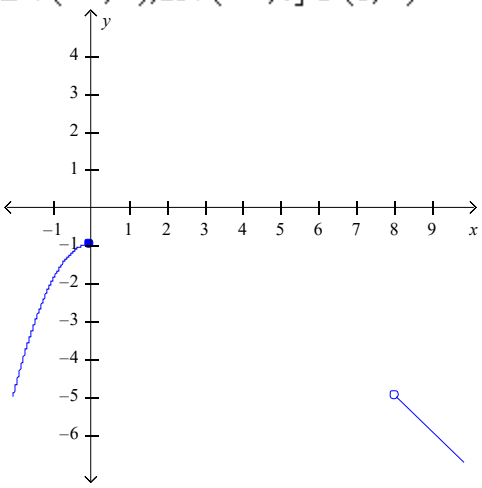
d.

ANS: A PTS: 1 DIF: Easy REF: 1.1.31
MSC: Bimodal NOT: Section 1.1

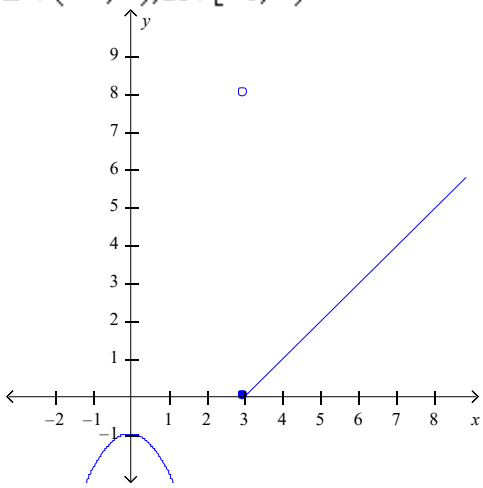
5. Find the domain and sketch the graph of the function. What is its range?

$$f(x) = \begin{cases} -x + 3 & \text{if } x \geq 3 \\ -x^2 - 1 & \text{if } x \geq 3 \end{cases}$$

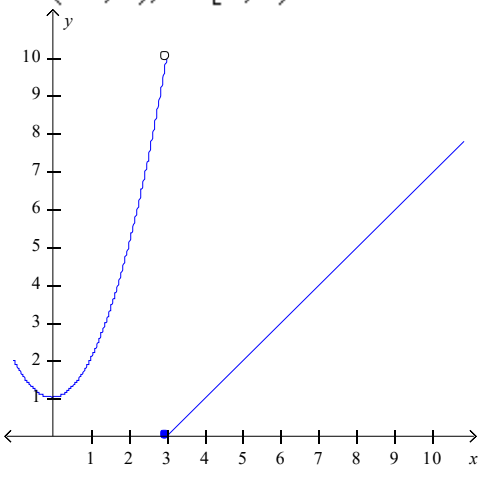
a. $\mathbf{D} : (-\infty, \infty); \mathbf{R} : (-\infty, 0] \cup (8, \infty)$



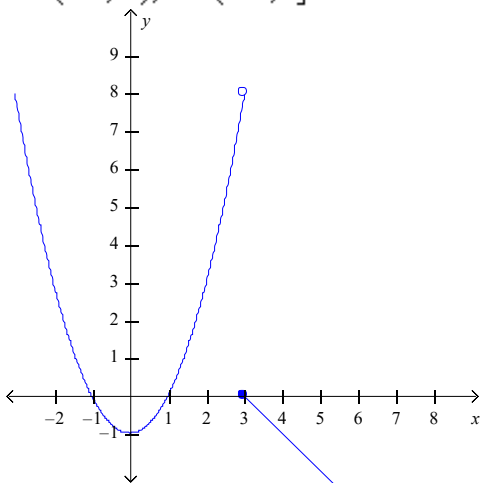
c. $\mathbf{D} : (-\infty, \infty); \mathbf{R} : [-1, \infty)$



b. $\mathbf{D} : (-\infty, \infty); \mathbf{R} : [0, \infty)$

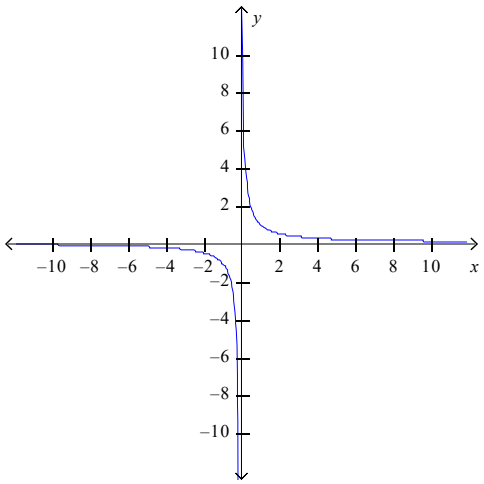


d. $\mathbf{D} : (-\infty, \infty); \mathbf{R} : (-\infty, 8]$



ANS: D PTS: 1 DIF: Medium REF: 1.1.47
MSC: Bimodal NOT: Section 1.1

6. Determine whether the function whose graph is given, is even, odd, or neither.



a. *Even*
b. *Neither*
c. *Odd*

ANS: C PTS: 1 DIF: Medium REF: 1.1.69
MSC: Bimodal NOT: Section 1.1

7. Find the domain of the function.

$$f(x) = \frac{x}{-4\sin x + 7}$$

a. $\left[\frac{7}{4}, \infty\right)$

b. $(-\infty, \infty)$

c. $[-7, 4]$

d. $[-4, 7]$

ANS: B PTS: 1 DIF: Easy REF: 1.1.32
MSC: Bimodal NOT: Section 1.1

8. A rectangle has perimeter 14 m. Express the area of the rectangle as a function $A(l)$ of the length l of one of its sides.

a. $A(l) = 7l - l^2$
b. $A(l) = 14l - l^2$
c. $A(l) = l - 7l^2$
d. $A(l) = 14l + l^2$
e. $A(l) = 7l + l^2$

ANS: A PTS: 1 DIF: Medium REF: 1.1.57
MSC: Bimodal NOT: Section 1.1

9. If $f(x) = x^2 - 6x + 1$, evaluate the difference quotient $\dfrac{f(a+h)-f(a)}{h}$.

a. $2a+h-6$
b. $6a-h$
c. h
d. $2a-h-6$
e. None of these

ANS: A PTS: 1 DIF: Medium REF: 1.1.28
MSC: Bimodal NOT: Section 1.1

10. Determine whether f is even, odd, or neither.

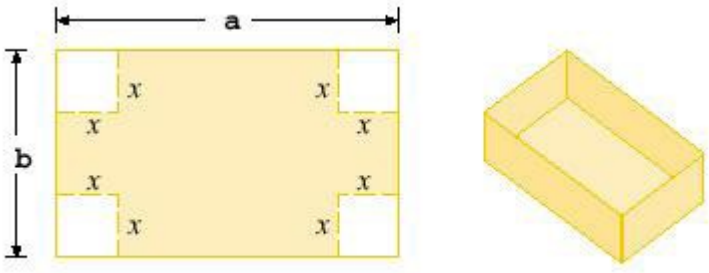
$$f(x) = \frac{7x^2}{x^4+2}$$

a. even
b. odd
c. neither

ANS: A PTS: 1 DIF: Medium REF: 1.1.74
MSC: Bimodal NOT: Section 1.1

11. A box with an open top is to be constructed from a rectangular piece of card board with dimensions $b = 8$ in. by $a = 28$ in. by cutting out equal squares of side x at each corner and then folding up the sides as in the figure.

Express the volume V of the box as a function of x.



a. $V(x) = 4x^3 - 72x^2 + 224x$
b. $V(x) = x^3 - 36x^2 + 196x$
c. $V(x) = x^3 - 72x^2 + 224x$
d. $V(x) = 4x^3 + 36x^2 + 196x$
e. $V(x) = 4x^3 + 72x^2 + 224x$

ANS: A PTS: 1 DIF: Medium REF: 1.1.63
MSC: Bimodal NOT: Section 1.1

12. In the function $f(x) = 8x + d$, what must be the value *d,* if $f(1) = 1$?

a. $d = 7$
b. $d = -5$
c. $d = 9$
d. $d = -7$
e. $d = 1$

ANS: D PTS: 1 DIF: Medium REF: 1.1.3d
MSC: Bimodal NOT: Section 1.1

13. Find the domain.

$g(u) = \sqrt{u} - \sqrt{3-u}$

a. $(0, 3)$

b. $(-\infty, 0]$

c. $(-3, \infty]$

d. $[0, 3]$

e. $[0, \infty)$

ANS: D PTS: 1 DIF: Medium REF: 1.1.34
MSC: Bimodal NOT: Section 1.1

14. Find the domain of the function.

$$f(x) = \frac{6x + 1}{x^3}$$

a. $\left(-\infty, -\frac{1}{6}\right) \cup \left(-\frac{1}{6}, \infty\right)$

b. $(-\infty, 0) \cup (0, \infty)$

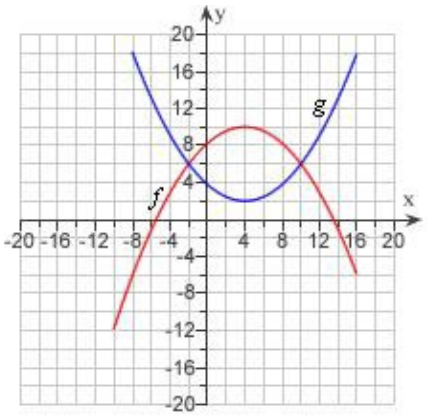
c. $(-\infty, 0)$

d. $\left(-\infty, \frac{1}{6}\right) \cup \left(\frac{1}{6}, \infty\right)$

ANS: B PTS: 1 DIF: Easy REF: 1.1.31
MSC: Bimodal NOT: Section 1.1

NUMERIC RESPONSE

1. The graphs of $f(x)$ and $g(x)$ are given.
   a) For what values of x is $f(x) = g(x)$?
   b) Find the values of $f(-2)$ and $g(4)$.



ANS:
a) –2, 10
b) $f(-2) = 6$, $g(4) = 2$

PTS: 1 DIF: Medium REF: 1.1.4ab
MSC: Numerical Response NOT: Section 1.1

2. A spherical balloon with radius r inches has volume $\frac{4}{3}\pi r^3$.
   Find a function that represents the amount of air required to inflate the balloon from a radius of r inches to a radius of $r+1$ inches.

ANS: $\frac{4}{3}\pi\left(3r^2+3r+1\right)$

PTS: 1 DIF: Medium REF: 1.1.26
MSC: Numerical Response NOT: Section 1.1

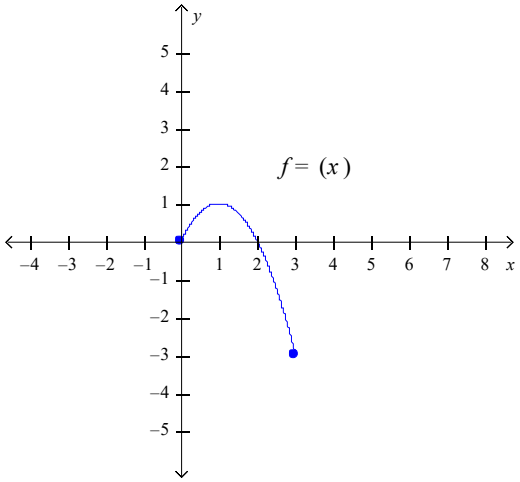
3. If the point $(9, 1)$ is on the graph of an even function, what other point must also be on the graph?

ANS: $(-9, 1)$

PTS: 1 DIF: Medium REF: 1.1.71a
MSC: Numerical Response NOT: Section 1.1

SHORT ANSWER

1. Refer to the graph of the function f in the following figure.

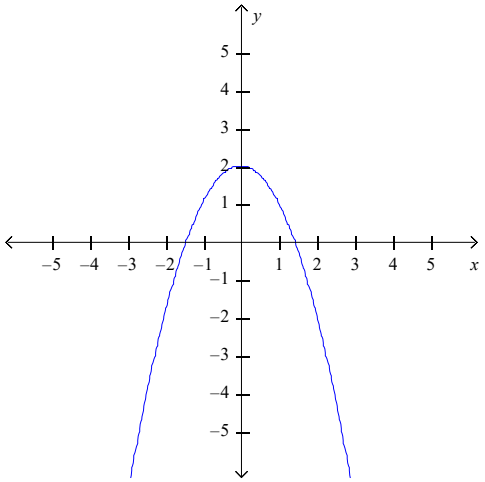


a. Find $f(0)$.
b. Find the value of x for which (i) $f(x) = 1$ and (ii) $f(x) = 0$.
c. Find the domain and range of f.

ANS:
a. 0
b. (i) 1 **(ii)** $0, 2$
c. $D : [0, 3], R : [-3, 1]$

PTS: 1 DIF: Easy REF: 1.1.3 MSC: Short Answer
NOT: Section 1.1

2. Use the vertical line test to determine whether the curve is the graph of a function of x.



ANS:
Yes

PTS: 1 DIF: Medium REF: 1.1.7 MSC: Short Answer
NOT: Section 1.1

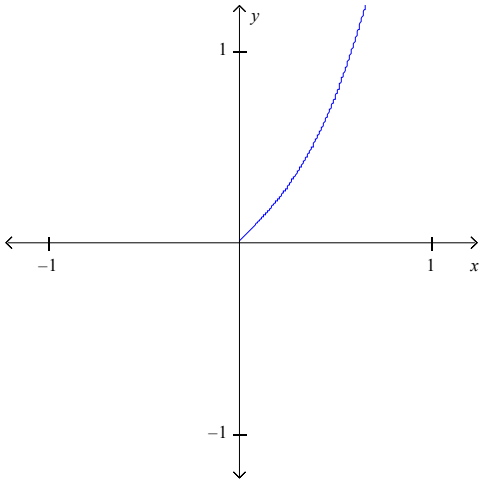
3. Determine whether the function is even, odd, or neither.

$f(x) = +13x^2 + 6x + 1$

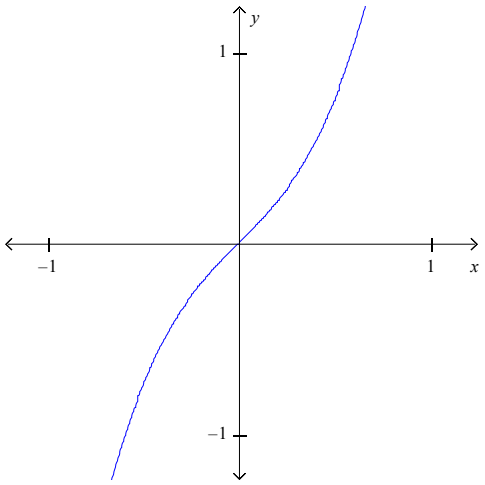
ANS:
Neither

PTS: 1 DIF: Medium REF: 1.1.77 MSC: Short Answer
NOT: Section 1.1

4. The following figure shows a portion of the graph of a function f defined on the interval $[-1, 1]$. Sketch the complete graph of f if it is known f is odd.

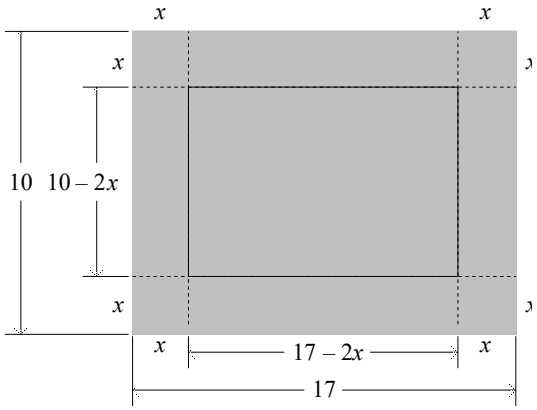


ANS:



PTS: 1 DIF: Medium REF: 1.1.72b MSC: Short Answer
NOT: Section 1.1

5. By cutting away identical squares from each corner of a rectangular piece of cardboard and folding up the resulting flaps, an open box can be made. If the cardboard is 17 in. long and 10 in. wide and the square cutaways have dimensions of x in. by x in., find a function that gives the volume of the resulting box.



ANS:
$V = 4x^3 - 54x^2 + 170x$

PTS: 1 DIF: Medium REF: 1.1.63 MSC: Short Answer
NOT: Section 1.1