2.6: Transformation of Functions

1. Which one of the following statements is TRUE about the function
$f(x) = \frac{x|x|}{\sqrt[3]{x}}$

   A) f is an even function

   B) f is an odd function

   C) f is neither an odd function, nor an even function

   D) $f(-18) = -f(18)$

   E) $f(0) = 0$

2. The domain D and the range R of the function $f(x) = 2 - \sqrt{6 - 3x}$
   are respectively given by

   A) $D = (-\infty, 2]$ and $R = (-\infty, 2]$

   B) $D = (-\infty, 2]$ and $R = [2, \infty)$

   C) $D = (-\infty, 2]$ and $R = [2,6]$

   D) $D = [2, \infty)$ and $R = [2, \infty)$

   E) $D = [2, \infty)$ and $R = (-\infty, 2]$

3. If the graph of the function $f(x) = 1 - \sqrt{x - 1}$ is reflected across the y-axis, then shifted 2 units to the right and 3 units upward, then the equation for the new graph is

A) $y = 4 - \sqrt{-x + 1}$

B) $y = 4 - \sqrt{-x - 1}$

C) $y = 4 - \sqrt{-x - 3}$

D) $y = 4 - \sqrt{-x + 3}$

E) $y = 4 - \sqrt{-x - 2}$

4. Which one of the following is an even function?

A) $h(x) = \dfrac{\sqrt[3]{x}}{x^3 - x}$

B) $h(x) = x + \dfrac{1}{x}$

C) $h(x) = 3 - \sqrt[3]{x}$

D) $h(x) = |x| - x$

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

5. Which one of the following statements is FALSE ?

A) The function $y = |x - 1|$ is decreasing on $[1, \infty)$

B) The range of the function $y = -|x|$ is $(-\infty, 0]$

C) The graph of a vertical line is not a function

D) The domain of the function $y = \sqrt{-x}$ is $(-\infty, 0]$

E) The function $y = x^3$ is increasing on $(-\infty, \infty)$

6. The graph of the equation $y = |x + 3| - 2$ may be obtained from the graph of $y = |x - 1| + 3$ by the following translations:

A) Four units to the left and five units down

B) Four units to the right and two units down

C) Three units to the left and two units down

D) Three units to the right and five units down

E) Two units to the left and one unit down

7. If the graph of $y = x^2 + x + 1$ is shifted left horizontally 2 units and shifted down vertically 7 units, then the equation of the new graph is equal to

A) $y = x^2 + 5x$

B) $y = x^2 + 4x$

C) $y = x^2 - 3x - 4$

D) $y = x^2 + 4x - 3$

E) $y = x^2 + 5x - 7$

8. If the graph of $f(x) = \sqrt{x-1} + 1$ is reflected across the y-axis, then shifted left horizontally 5 units and up vertically 3 units, then the equation of the new function $g(x)$ is

A) $g(x) = \sqrt{-x-6} + 4$

B) $g(x) = -\sqrt{x-6} + 4$

C) $g(x) = -\sqrt{-x-6} + 3$

D) $g(x) = \sqrt{-x-6} + 3$

E) $g(x) = \sqrt{-x-6} + 2$

9. Let f be a function such that $f(-1) = 3$ and $f(2) = -4$. The coordinates of two points on the graph of $y = 3f(-x) - 2$ are

  A) $(1,7), (-2, -14)$

  B) $(1,1), (-2, -14)$

  C) $(1,7), (2,2)$

  D) $(1,7), (2,4)$

  E) $(-1,1), (2,6)$

10. The graph of the equation $y^2 = x^2 + 6x - 2y + 8$ is the graph of $y^2 = x^2$ shifted

  A) down vertically 1 unit and left horizontally 3 units

  B) down vertically 2 units and left horizontally 3 units

  C) down vertically 3 units and left horizontally 1 unit

  D) down vertically 1 unit and left horizontally 2 units

  E) up vertically 1 unit and right horizontally 3 units

11. If the graph of the equation $Ax^2 + By^2 + Cx + Dy + E = 0$ is obtained from $2x^2 - 3y^2 = 6$ by means of a horizontal translation of three units to the left and vertically three units upward, then $A + B + C + D + E$ is equal to

A) 14

B) -14

C) 41

D) -41

E) 0

12. If $f(x)$ is an even function such that $f(-3) = 4$, then the coordinates of two points that must lie on the graph of $y = 3f(2x)$ are

A) $(\frac{3}{2}, 12)$ and $(-\frac{3}{2}, 12)$

B) $(6, 4/3)$ and $(-6, 4/3)$

C) $(\frac{3}{2}, 4/3)$ and $(-\frac{3}{2}, 4/3)$

D) $(1, 2)$ and $(-1, 2)$

E) $(6, 12)$ and $(-6, 12)$

13. Which one of the following statement is TRUE?

B) $f(x) = 3|x|$ is an odd function

C) $f(x) = 2 + 4x + x^2$ is an even function

D) $f(x) = x^3 - 5$ is an odd function

E) $f(x) = \sqrt{7 - x^2}$ is neither an even nor odd function

14. Which one of the following statements is TRUE?

B) $f(x) = 5$ is an odd function

C) $f(x) = x|x|$ is an even function

D) $f(x) = 5$ is neither odd nor even

E) $y = x^3$ is an even function

15. Let $f(x)$ be any nonzero function, then $g(x) = \frac{1}{2}[f(x) + f(-x)]$ is

    A) odd

    B) neither odd nor even

    C) both even and odd

    D) constant

    E) even.

16. The graph of the equation $(x + 1)^2 + (y - 2)^3 = 4$ may be obtained from the graph of $x^2 + y^3 = 4$ by means of the following translations:

    A) Two units to the left and one unit up

    B) Two units to the right and one unit down

    C) One unit to the right and two units up

    D) One unit to the right and two units down

    E) One unit to the left and two units up

17. If the graph of the equation $x = y^2 + y$ is shifted one unit to the left and two units upward, then the equation of the new graph is

A) $x = y^2 - 3y + 3$

B) $x = y^2 - 3y + 1$

C) $x = y^2 + 5y + 5$

D) $x = y^2 + 2y + 7$

E) $x = y^2 + y$

18. By translating the graph of the equation $(x + 1)^2 + (y - 2)^3 = 1$ two units to the right and two units downward, the equation of the new graph is
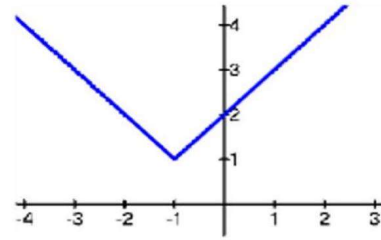
A) $(x + 3)^2 + (y - 4)^3 = 1$

B) $x^2 - 2x + y^3 = 0$

C) $(x - 1)^2 + (y - 4)^3 = 1$

D) $x^2 + y^3 = 2$

E) $(x + 1)^2 + (y - 2)^3 = 5$

19. The adjacent figure is the graph of $y = f(x)$. If $E(x) = |x - 1| + 1$, then which one of the following is TRUES?

A) $f(x) = -E(x)$

B) $f(x) = E(-x)$

C) $f(x) = E(x - 1)$

D) $f(x) = E(x + 1)$

E) $f(x) = E(x/2)$

20. If $f(2) = -7$, then which of the following points must be on the graph of the function $h(x) = f(x - 1) + 3$

A) $(3,4)$

B) $(-2,7)$

C) $(-2,10)$

D) $(3, -4)$

E) $(-1, -10)$

21.Which one of the following statement is TRUE ?

A) $f(x) = x^2 - |x|$ is an even function

B) $f(x) = 4 + \sqrt[3]{x}$ is an even function

C) $f(x) = 5$ is an odd function

D) $f(x) = x^5 + x^3 + 1$ is an odd function

E) $f(x) = x^2/(x^2 + 1)$ is neither odd nor even function

22. Which of the following equations defines an odd function

A) $y = |x^3|$

B) $y = 2x + 1$

C) $y = (6x^2 + x^4)/(x^3 + 2x)$

D) $y = x\left(\sqrt[3]{x^5} - x\right)$

E) $f(x) = \sqrt{4x - x^3}/(x^7 + 1)$

23. The graph of the function $f(x) = \sqrt{-x}$ is reflected across the y-axis, shifted 2 units to the right and then 1 unit downward. If the equation of the new graph is $g(x) = \sqrt{x + b} + c$, then $b + c =$

A) -3

B) 2

C) -2

D) -1

E) 3

24. If $f(-4) = -2$, then the coordinates of the point that lies on the graph of $g(x) = -3f(1 - x) - 2$ is

A) (5,4)

B) (−3,4)

C) (5,3)

D) (−3,6)

E) (2,4)

25. Let f be a function such that $(1, -2)$ is a point on the graph of f. If (a, b) is the corresponding point that lies on the graph of $g(x) = -f(x - 3) + 2$, then $a + b =$

   A) 4

   B) 6

   C) 8

26. Let $f(x) = x^2 - 2x$. If g is obtained from f by reflecting its graph across the y-axis, shifting 1 unit right and then 1 unit upward, then $g(x) =$

   A) x^2

27. Which ONE of the following is TRUE about the functions $f(x) = x(x + 1)(x - 1)$ and $g(x) = x\sqrt[3]{x}$?

A) f is odd and g is even