$2.2 - 2.3$: Graphs of Functions

1. The graph of the equation $xy = |x^3 - y|$ is

   A) symmetric with respect to the x-axis only.

   B) symmetric with respect to the x-axis and y-axis.

   C) symmetric with respect to the origin only.

2. The range of the function $f(x) = \begin{cases} x^2 - 1 & \text{if } x \geq 0 \\ \frac{|x|}{x} & \text{if } x < 0 \end{cases}$, is

   A) $[-1, \infty)$

   B) $(-\infty, 1]$

   C) $(-\infty, \infty)$

   D) $(0, \infty)$

   E) $(-1, \infty)$

3. Which one of the following represent y as a function of x ?

A) $2|x| + y = 0$

B) $2x + |y| = 0$

C) $\sqrt{y^2} - x^4 = 0$

D) $x = 1$

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

4. If $[a, b]$ is the largest interval on which the function

$$f(x) = \begin{cases} 4 & ; \quad x \leq -1 \\ x^2 & ; \quad -1 < x < 1 \\ -x + 5 & ; \quad x \geq 1 \end{cases}$$ is increasing, then $a + b =$

A) 1

B) -1

C) 0

D) 2

E) 4

5. The graph of the function $f(x) = \left[\!\left[\frac{x}{2} - 3\right]\!\right]$, lies above the x-axis over the interval

A) $[8, \infty)$

B) $(-6,6)$

C) $(-3, \infty)$

D) $(0, \infty)$

E) $(6, \infty)$

6. The range of $f(x) = \begin{cases} |x| + 1 & ; \quad x < 1 \\ -x^2 - 1 & ; \quad 1 \leq x < 2 \\ 3 & ; \quad x \geq 2 \end{cases}$, is:

A) $(-5, -2] \cup [1, \infty)$

B) $(-\infty, -2] \cup [1, \infty)$

C) $(-\infty, -1] \cup [1, \infty)$

D) $(-5, -1] \cup (3, \infty)$

E) $(-5, -2] \cup [1,2) \cup (2, \infty)$

7. If D is the domain of $f(x) = \sqrt{16 - x^2}$ and R is the range of $g(x) = [\![x + 1]\!]$ where $[\![x]\!]$ denotes the greatest integer function of x, then $D \cap R =$

A) $\{-4, -3, -2, -1, 0, 1, 2, 3, 4\}$

B) $(-4, 4)$

C) $[-4, 4]$

D) $(-\infty, \infty)$

E) $(-\infty, -4] \cup [4, \infty)$

8. If $f(x) = \frac{2}{3}x + 2$, then $f(x - 3) =$

A) $f(x) - 2$

B) $f(x) + 2$

C) $f(x) - 3$

D) $f(x) + 3$

E) $f(x) + 2/3$

9. In the graph of $f(x) = \begin{cases} |x| - 1 & \text{if } x > -1 \\ x - 1 & \text{if } x \leq -1 \end{cases}$ we have

A) one x-intercept and one y-intercept

B) one x-intercept and two y-intercepts

C) two x-intercepts and one y-intercept

D) two x-intercepts and two y-intercepts

E) two x-intercepts only

10. Let $f(x) = [\![x]\!]$ be the greatest integer function. Then only one of the following statements is TRUE?

A) $y = [\![x]\!]$ is not a function by the vertical line test

B) $[\![\pi - 1]\!] = 3$

C) $[\![x]\!] = -3$ if $-4 \leq x < -3$

D) the range of $y = [\![x - 1]\!]$ is the set of all integers

E) the domain of $y = [\![x - 1]\!]$ is the set of all integers

11.If $f(x) = [\![1 - 2x]\!]$, where $[\![\quad]\!]$ is the greatest integer function, then $f(x) = 1$ when

A) $0 \leq x < \frac{1}{2}$

B) $-\frac{1}{2} < x \leq 0$

C) $-\frac{1}{2} \leq x < 0$

D) $-1 < x \leq 1$

E) $\frac{1}{2} < x \leq 1$

12.If $f(x) = \begin{cases} 2x & x \leq -2 \\ x^2 & -2 < x < 1 \\ 4 - x & x \geq 1 \end{cases}$, then $f(x)$ has

A) two x-intercepts and onc y-intercept.

B) one x - intercept and one y - intercept

C) one x-intercept and two y - intercepts.

D) two x - intercepts and two y-intercepts.

E) one x - intercept only.

13.If $f(x) = [\![3x - 1]\!]$ where $[\![\quad]\!]$ is the greatest intger function, then $f(x) = 0$ when

A) $\frac{1}{3} \leq x < \frac{2}{3}$

B) $\frac{1}{3} < x \leq 1$

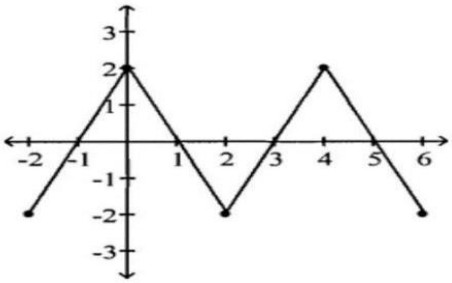
C) $-3 < x \leq \frac{1}{3}$

D) $\frac{2}{3} \leq x < 1$

E) $-3 \leq x < 1$

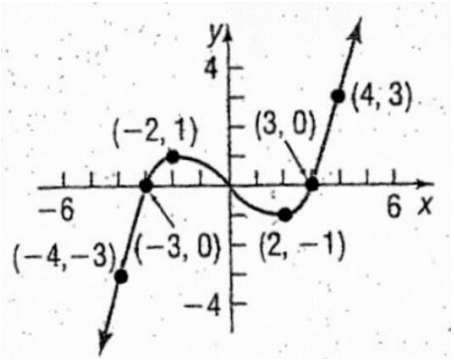
14.From the adjacent graph, the intervals over which the function is increasing:

A) $[-2,0]$ and $[2,4]$



15.From the adjacent graph, the function is decreasing on the interval:

A) $[-2,2]$



16.The graph of $f(x) = \begin{cases} 2 & \text{if} \quad x < 0 \\ (x-1)^2 & \text{if} \quad x \geq 0 \end{cases}$ is increasing on the interval

A) $(1, \infty)$

B) $(0, \infty)$

C) $(-\infty, 1)$

D) $(-\infty, 0)$

E) $(0,1)$

17.If $f(x) = \begin{cases} [\![2x+6]\!], & \text{if } x \leq -1 \\ |3x-4|, & \text{if } -1 \leq x \leq 2, \\ 3, & \text{if } x > 2 \end{cases}$

then $f(-\pi) + f(1) + f(4) =$

A) -3

B) $-2\pi + 9$

C) $-2\pi + 10$

D) 3

E) 4

18.Let $f(x) = \begin{cases} -x+1, & \text{if } x \leq 0 \\ |x-1|, & \text{if } 0 < x \leq 2. \\ 1, & \text{if } x > 2 \end{cases}$ Then the graph of f is

increasing on the interval

A) $(2, \infty)$

B) $(1,2)$

19.The range of the function $f(x) = 3 - |x - 1|$ is given by

A) $(-\infty, 3]$

20.The graph of the function $f(x) = \begin{cases} |x|, & \text{if } x \leq 1; \\ 5, & \text{if } x > 1, \end{cases}$ is increasing on the interval

A) $(0,1)$

B) $(1, \infty)$

C) $(-\infty, 0)$

D) $(-\infty, \infty)$

E) $(0, \infty)$

21. The range of the function $f(x) = \begin{cases} x^2 + 1, & \text{if } x \geq 0; \\ x - 1, & \text{if } x < 0, \end{cases}$ is

A) $(-\infty, -1) \cup [1, \infty)$

B) $(-\infty, 1]$

C) $(-\infty, \infty)$

D) $(1, \infty)$

E) $(-1, \infty)$

22. Identify the set of ordered pairs (x, y) or relation that defines y as a function of x

A) $5y + x = 2y + \sqrt{x^2 - 5}$

B) $(x - 1)^2 + (y - 2)^2 = 25$

C) $\{(1/2,0), (2, -1), (3,3), (1/2,1/4)\}$

D) $|5y - 1| = 2x + 5$

E) $-4x^2 + y^2 = 9$

23. Which one of the following relations DOSE NOT represent a function?

A) $y^2 = 3x + 6$

B) $x + 5y = 7$

C) $y = x^2 - 4$

D) $y = \sqrt{2x - 1}$

E) $y = \frac{3}{x-2}$

24. Which one of the following relations defines y as a function of x ?

A) $y = \sqrt{2x + 1}$

B) $x = y^4$

C) $\{(1,10), (2,15), (3,19), (2,19), (5,27)\}$

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

E) $x = 5$

25. Which one of the following relations defines y as a function of x ?

A) $y^3 + 3x = 1$

B) $x^2 + 4y^2 = 1$

C) $x = |y + 2|$

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

E) $\{(x, y) \mid x = 2\}$

26. Which one of the following equations or the set of ordered pairs defines y. as a function of x ?

A) $|5y - 1| = 3x$

B) $xy - y = 7$

C) $x + 2 = y^4$

D) $\{(x, y): x = 1\}$

E) $\{(-2,4), (0,6), (2,5), (0,8)\}$

27.Which ONE of the following equations defines y as a function of x ?

A) $|x| + y = 5$

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

C) $\sqrt{y^2} - x = 5$

D) $y = 3 \pm \sqrt{x - 1}$

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

28.Which ONE of the following does NOT represent y as a function of x?

A) $y = 1$

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

C) $2y + |x| = 0$

D) $x^2 - \sqrt[3]{y} = 0$

E) $x + 2|y| = 0$

29. Which one of the following equations DOES NOT represent y as a function of x ?

A) $x^2 - |y| = 4$

B) $x^2 - 2y = 8$

C) $2x - y = -6$

D) $|x| - 3y = 4$

E) $x^4 - y^3 = 3$

30. Which one of the following does NOT define y as a function of x ?

A) $4x = \sqrt{y^2}$

B) $xy = 5$

C) $x^2 - 1 = \sqrt{y}$

D) $|x| - y = 3$

E) $\{(2,5), (3,3), (4,4), (5,2)\}$

31.If $f(x)=\begin{cases}-|-x| & \text{if} \quad x<0\\ -2 & \text{if} \quad 0\le x<4\\ [\![x-4]\!] & \text{if} \quad x\ge 4\end{cases}$, where $[\![\quad]\!]$ is the greatest integer function, then $f(-2)+f(0)+f(2\pi)=$

A) -2

B) -6

C) 2

D) -1

E) 6

32.If $f(x)=\begin{cases}\sqrt{(1-5x)^2}, & \text{if } x<2\\ [\![2x+1]\!], & \text{if } x\ge 2\end{cases}$, then $f(\pi)+f(1)=$

A)11

B) 7

C) -4

D) $5\pi+2$

E) $2\pi+5$

33.If $f(x)=\begin{cases}-x^2+6 & \text{if } x<-3\\ |2+5x| & \text{if } -3\le x<1\\ [\![3x-4]\!] & \text{if } x\ge 1\end{cases}$, where $[\![\ \ ]\!]$ denotes the greatest integer function, then $f(\pi)-f(-2)=$

A) -3

B) 13

C) 0

D) 7

E) -7

34.The function $f(x)=\begin{cases}\frac{|x|}{x} & \text{if } x<0\\ 4-x^2 & \text{if } x\ge 0\end{cases}$ and $k<0$, then $f(k)-(1/5)f(3)=$

A) 0

B) -2

C) -6

D) 2

E) 6

35.If $f(x) = \begin{cases} [\![3-2x]\!] & \text{if} \quad 0 \le x < 3 \\ |4x-1| & \text{if} \quad -3 \le x < 0 \\ -2 & \text{if} \quad x < -3 \end{cases}$, then $f(11/4) + f(-2) + f(-5) =$

A) 4

B) -1

C) -20

D) -15

E) 5

36.Given $f(x) = \begin{cases} 2x+1 & \text{if } x < 2 \\ [\![2x+1]\!] & \text{if } x \ge 2 \end{cases}$, where $[\![\quad]\!]$ is the greatest integer function, then $f(-4) + f\left(\frac{7}{3}\right)$ is equal to

A) -2

B) $\frac{20}{3}$

C) -3

D) -9

E) $-\frac{4}{3}$

37. Given $f(x) = \begin{cases} \sqrt{(1-5x)^2} & \text{if } x < 2 \\ [\![2x+1]\!] & \text{if } x \geq 2 \end{cases}$,

where $[\![\quad]\!]$ is the greatest integer function, then $f(\pi) + f(1)$ is equal to

A) 11

B) $5\pi + 2$

C) -4

D) 7

E) $2\pi + 5$

38. For the function $f(x) = \begin{cases} [\![x-1]\!] & \text{if } x > 0 \\ |2x-5| & \text{if } x \leq 0 \end{cases}$, where $[\![\quad]\!]$ is the greatest integer function, then $f(\pi) - f(-1/2) =$

A) -4

B) 3

C) -2

D) 4

E) -3

39.The set of all values of x for which $\left[\left[\frac{1}{2}x+1\right]\right]=-3$, where $[\![\cdot]\!]$ denotes the greatest integer function, is in the interval

A) $[-8,-6)$

B) $[-4,-3)$

C) $[-7,-5)$

D) $[-3,0)$

E) $[6,8)$