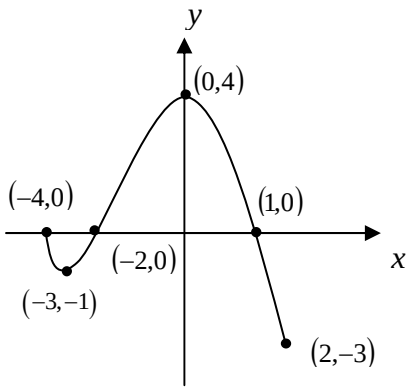
Given below is the graph of a function, $y = f(x)$. Use this graph to answer questions #1 and #2:



1. Find the intervals for which the function is decreasing.

A. $[-1,-3]\cup[0,4]$

B. $[-3,0]$

C. $[-4,-3]\cup[0,2]$

D. $[-4,2]$

E. $[-3,0]\cup[1,4]$

2. Find the values of *x* for which $f(x)>0$. Express your answer in interval notation.

A. $(-4,0)\cup(1,2)$

B. $(-2,1)$

C. $(-4,0)$

D. $(-4,-2)\cup(1,2)$

E. None of the above

3. Suppose *y* is directly proportional to the product of *x* and *w* and inversely proportional to the square root of *t*. If *x*=3, *w*=2, and *t* =4, then *y*=12. Find *y* when *x*=5, *w*=1, and *t* =9.

A. $y=4$

B. $y=\frac{160}{3}$

C. $y=3$

D. $y=\frac{20}{3}$

E. Not enough information given.

Use the functions $f(x)=\sqrt{2x+1}$ and $g(x)=x^2-6$ to answer questions #4 and #5:

4. Find $(f-g)(4)$.

A. -7

B. 13

C. -19

D. 25

E. None of the above

5. Find and simplify $(g\circ f)(x)$.

A. $x^2\sqrt{2x+1}-6$

B. $\sqrt{2x^3-12x+1}$

C. $\left(\sqrt{2x+11}\right)\left(x^2-6\right)$

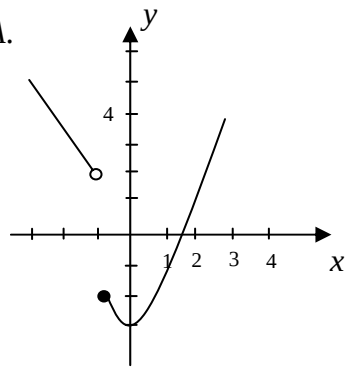
D. $\sqrt{2x^2-11}$

E. $2x-5$

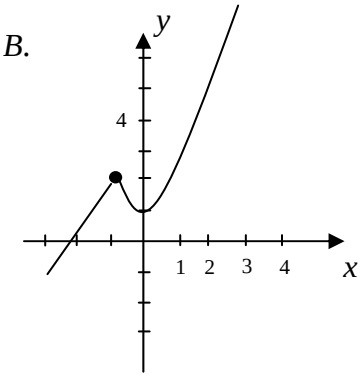
6. Which of the following graphs depicts the piecewise-defined function given below?

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

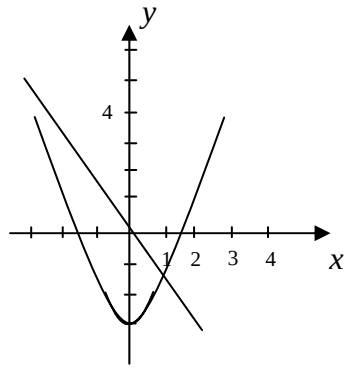
A.



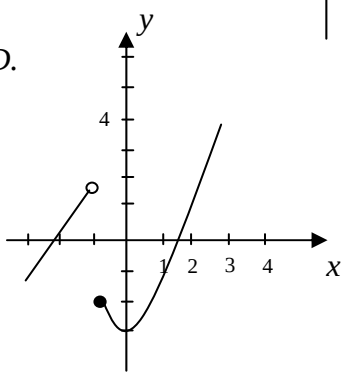
B.



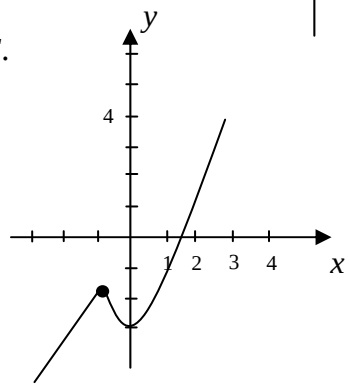
C.



D.



E.



7. If the point $P(3,5)$ is on the graph of $y = f(x)$, find the corresponding point on the graph of $y = 2f(x+4)$.

A. $(6,9)$

B. $(-1,10)$

C. $(6,1)$

D. $(7,10)$

E. None of the above

8. Explain in words how the graph of $y = -f(x)+5$ compares to the graph of $y = f(x)$.

A. Reflect the graph of $y = f(x)$ through the $x-$axis first, then shift left 5.

B. Reflect the graph of $y = f(x)$ through the $y-$axis first, then shift up 5.

C. Reflect the graph of $y = f(x)$ through the $x-$axis first, then shift right 5.

D. Reflect the graph of $y = f(x)$ through the $x-$ axis first, then shift up 5.

E. Reflect the graph of $y = f(x)$ through the $y-$ axis first, then shift right 5.

9. Solve the inequality. Express the answer in interval notation.

$$\frac{(x-1)(x+3)}{x-5} < 0$$

A. $(-\infty,1)\cup(1,5)$

B. $(-3,1)\cup(5,\infty)$

C. $(-\infty,-3)\cup(1,\infty)$

D. $(-\infty,5)\cup(5,\infty)$

E. $(-\infty,-3)\cup(1,5)$

10. Express $f(x) = 2x^2 - 16x + 25$ in standard form.

A. $f(x) = 2(x-4)^2 + 9$

B. $f(x) = 2(x+4)^2 - 9$

C. $f(x) = 2(x-4)^2 - 7$

D. $f(x) = 2(x+4)^2 + 7$

E. None of the above

11. Given $f(x) = x^2 - 2x$, find and simplify $\dfrac{f(x+h) - f(x)}{h}$.

A. $\dfrac{x^2 + h^2 - 2h}{h}$

B. $2x + h - 2$

C. $2x - 2$

D. $x^2 + h - 2$

E. None of the above

12. Solve the following system of equations for *x*.

$$\begin{cases} x^2 + y = 9 \\ x - y + 3 = 0 \end{cases}$$

A. $x = -3, \quad x = 2$

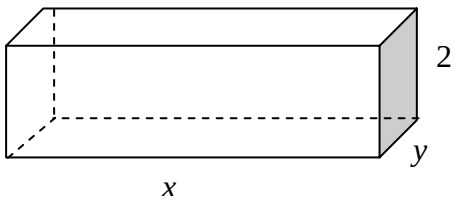
B. $x = -1, \quad x = 6$

C. $x = -2, \quad x = 3$

D. $x = -6, \quad x = 1$

E. There is no solution for *x*.

13. An open box with length *x* feet, width *y* feet, and height 2 feet is shown below. It is known that the surface area for this box is 92 square feet and the equation to represent this is $xy + 4x + 4y = 92$. Express the volume of this box as a function of *x*.



A. $V(x) = 2x(92 - 4x^2)$

B. $V(x) = 2x\left(\dfrac{23 - x}{x + 1}\right)$

C. $V(x) = 2x^2$

D. $V(x) = 2x\left(\dfrac{92 - 4x}{x + 4}\right)$

E. Not enough information given.

14. Two children were bouncing a ball. During one particular bounce, the ball traveled a horizontal distance of 6 feet and its maximum height above the ground was 4 feet. The path was in the shape of a parabola. Find the standard equation of the parabola described by this information. Let x represent the horizontal distance in feet from the point the bounce started and y represent the height above the ground in feet.

A. $y = -(x-6)^2 + 4$

B. $y = -\frac{3}{8}(x-4)^2 + 6$

C. $y = -\frac{4}{9}(x-3)^2 + 4$

D. $y = -\frac{3}{2}(x-2)^2 + 6$

E. $y = -\frac{1}{9}(x-6)^2 + 4$

15. The math club, The Radicals, sold two different types of shirts. T-shirts sold for \$9 apiece while sweatshirts sold for \$16 apiece. The secretary misplaced the individualized order forms but knows 57 total people placed an order and has written a check in the amount of \$751 to cover the entire order. If x represents the number of T-shirts ordered and y the number of sweatshirts ordered, choose the system of equations that can be used to find x and y. Do not solve.

A. $\begin{cases} x + y = 57 \\ 16x + 9y = 751 \end{cases}$

B. $\begin{cases} x + y = 57 \\ 9x + 16y = 751 \end{cases}$

C. $\begin{cases} x + y = 751 \\ 9x + 16y = 57 \end{cases}$

D. $\begin{cases} x + y = 751 \\ 16x + 9y = 57 \end{cases}$

E. None of the above