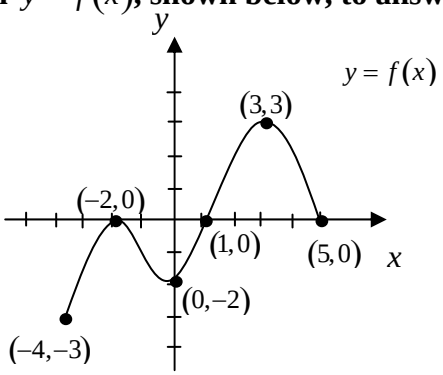
Use the graph of the function $y = f(x)$, shown below, to answer questions #1 and #2:



1. Find the intervals for which f is increasing.

A. $[-3,0]\cup[-2,3]$

B. $[1,5]$

C. $[-4,-2]\cup[3,5]$

D. $[-3,0]$

E. None of the above

2. Find all values of x such that $f(x)<0$.

A. $[-2,0)\cup[3,5)$

B. $[-4,-2)\cup(-2,1)$

C. $[-3,0)\cup(0,1)$

D. $[0,1)\cup(1,5)$

E. $[-4,-2)\cup[0,1)$

3. Suppose *y* is directly proportional to the product of *x* and the square of *w* and inversely proportional to the sum of *r* and *s*. If $x=2,\ w=3,\ r=1,$ and $s=5$, then $y=15$. Find the value of the constant of proportionality, *k*.

A. $k=5$

B. $k=\frac{18}{5}$

C. $k=3$

D. $k=\frac{1}{2}$

E. None of the above

4. Solve the following system of equations for x.

$$\begin{cases} y = x^2 + 4x - 7 \\ 2x - y = -1 \end{cases}$$

A. $x = -1, \quad x = 2$

B. $x = -4, \quad x = 2$

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

D. $x = -4, \quad x = 6$

E. None of the above

Use the functions $f(x) = x^2 - 5$ and $g(x) = x + 2$ to answer questions #5 and #6:

5. Find and simplify $(f - g)(-1)$.

A. -3

B. -1

C. -5

D. 3

E. None of the above

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

A. $x^3 + 2x^2 - 5$

B. $x^2 - 1$

C. $x^3 + 2x^2 - 5x - 10$

D. $x^2 - 3$

E. $x^2 + 4x - 1$

7. Given the parabola $f(x) = 3x^2 - 6x + 1$, state and identify the maximum or minimum value.

A. 1; maximum value

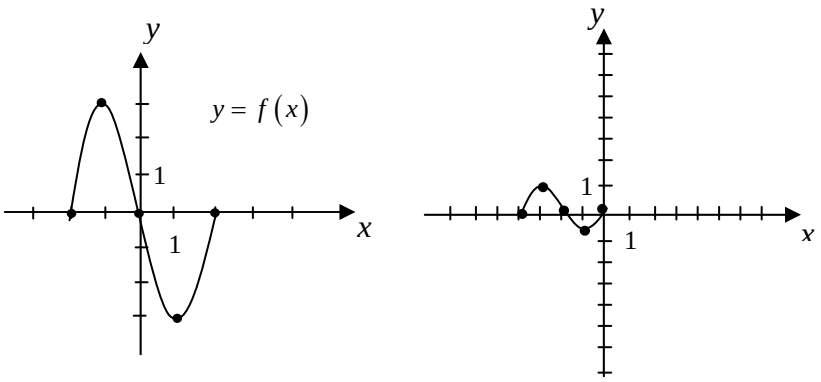
B. -2; maximum value

C. 1; minimum value

D. -2; minimum value

E. None of the above

8. Given below, on the left, is the graph of a basic function, $y = f(x)$. The graph on the right was obtained by shifting, reflecting, stretching, and/or compressing the basic graph. Which of the following best describes the graph on the right?



A. $y = 3f(x+2)$

B. $y = \frac{1}{3}f(x-2)$

C. $y = 3f(x-2)$

D. $y = \frac{1}{3}f(x+2)$

E. Not enough information given.

9. If the point, $P(-3,1)$ is on the graph of $y = f(x)$, find the corresponding point on the graph of $y = -f(6x)+4$.

A. $\left(-\frac{1}{2},3\right)$

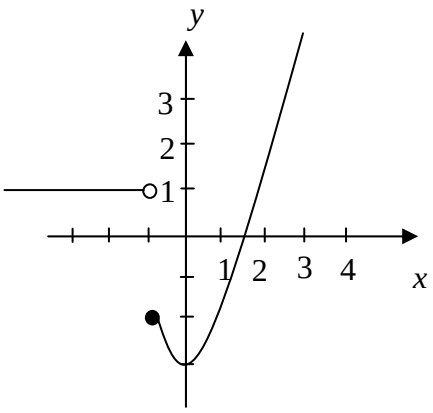
B. $(-18,-5)$

C. $(-18,3)$

D. $\left(-\frac{1}{2},-5\right)$

E. None of the above

10. Given below is the graph of a piecewise-defined function. Choose the function that corresponds to this graph.



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

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

C. $f(x) = \begin{cases} -1 & \text{if } x \leq 1 \\ x^2 - 3 & \text{if } x > 1 \end{cases}$

D. $f(x) = \begin{cases} 1 & \text{if } x \leq -1 \\ x^2 - 3 & \text{if } x > -1 \end{cases}$

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

11. Find the domain of $f(x)=\dfrac{\sqrt{x+1}}{x^2+2x-15}$. Express your answer in interval notation.

A. $(-\infty,3)\cup(3,\infty)$

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

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

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

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

12. Solve the following inequality. Express your answer in interval notation.

$$(x-2)^2(x+1)(x-5)<0$$

A. $(-1,2)\cup(2,5)$

B. $(-\infty,2)\cup(5,\infty)$

C. $(-\infty,-1)\cup(-1,2)$

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

E. None of the above

13. The speed of an airplane in still air is constant. The airplane, flying with the wind, travels 1800 miles in 3 hours. The return trip back to the starting point, against the wind, took 4 hours. Find the rate of the wind.

A. 75 mph

B. 60 mph

C. 68 mph

D. 85 mph

E. None of the above

14. During a recent baseball game, a batter popped up a pitch into the shallow outfield. The path the ball took was in the shape of a parabola. The ball was not caught and landed on the ground after 4 seconds. Let y = the height of the ball in feet and x = time in seconds. If the maximum height the ball reached was 120 feet, find a standard equation for the path of the ball. Disregard the height of the batter.

A. $y = -7.5(x-2)^2 + 120$

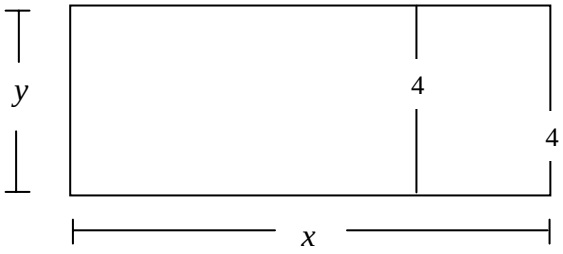
B. $y = -30(x-2)^2 + 120$

C. $y = -x^2 + 120$

D. $y = -7.5(x+2)^2 + 120$

E. $y = -30(x+2)^2 + 120$

15. An office cubicle is to have two rooms with each room having a 4 foot opening as shown below. The total cubicle (both rooms) will have 750 square feet of space. The walls cost \$50 per foot. Express the cost, *C*, of the walls as a function of *x*. Disregard the thickness of the walls. Simplify your function.



A. $C(x) = 2x + \frac{150}{x} - 8$

B. $C(x) = \frac{379,000}{3}x - \frac{100}{3}x^2$

C. $C(x) = 200x + \frac{150,000}{x} - 400$

D. $C(x) = 100x + \frac{112,500}{x} - 400$

E. $C(x) = \frac{8}{3}x - \frac{20}{3}x^2$

Question #	**Green Form** Fall 2006	**Answer**
1	E	None of the above $[-4,-2]\cup[0,3]$
2	B	$[-4,-2)\cup(-2,1)$
3	A	$k=5$
4	B	$x=-4,\quad x=2$
5	C	-5
6	E	x^2+4x-1
7	D	-2; minimum value
8	D	$y=\frac{1}{3}f(x+2)$
9	A	$\left(-\frac{1}{2},3\right)$
10	E	$f(x)=\begin{cases}1 & \text{if } x<-1\\ x^2-3 & \text{if } x\geq -1\end{cases}$
11	B	$[-1,3)\cup(3,\infty)$
12	A	$(-1,2)\cup(2,5)$
13	A	75 mph
14	B	$y=-30(x-2)^2+120$
15	D	$C(x)=100x+\frac{112,500}{x}-400$