Use the functions, $f(x)=\dfrac{2x+1}{x-5}$ and $g(x)=x+3$, to answer questions #1 and #2:

1. Find and simplify $(f+g)(3)$.

A. $\dfrac{5}{2}$

B. $-\dfrac{1}{2}$

C. $-\dfrac{13}{2}$

D. $\dfrac{3}{2}$

E. None of the above.

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

A. $\dfrac{5x-14}{x-5}$

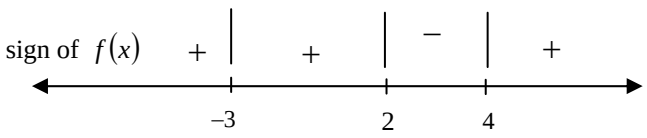
B. $\dfrac{2x^2+4x-15}{x-5}$

C. $\dfrac{2x+7}{x-2}$

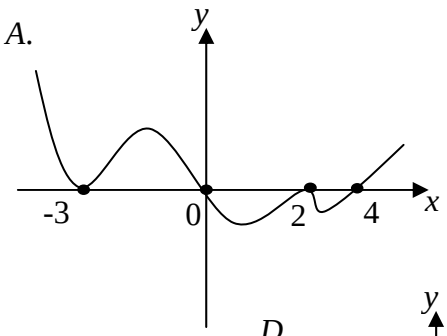
D. $\dfrac{2x^2+6x+1}{x^2+3x-5}$

E. None of the above.

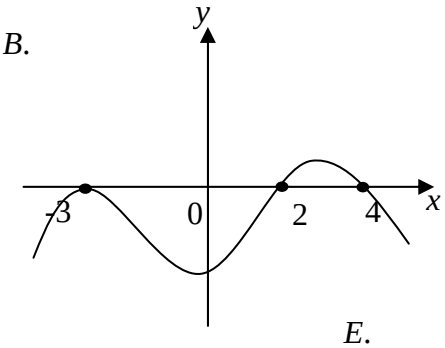
3. Which of the following graph best depicts the sign chart given by:



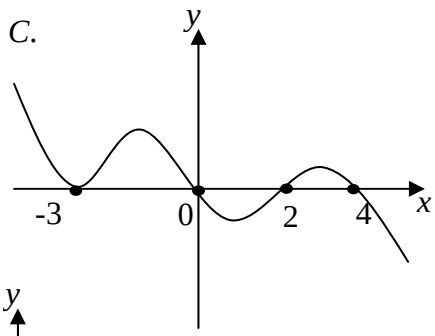
A.



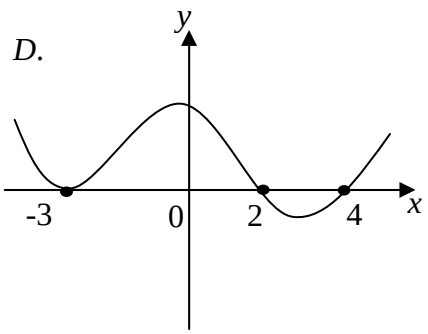
B.



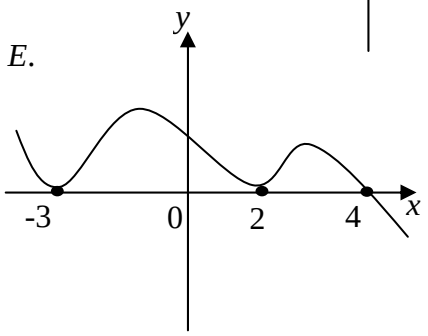
C.



D.



E.



4. Suppose *y* is directly proportional to the product of *w* and the square root of *x* and inversely proportional to the cube of *p*. If $w = 4, x = 25,$ and $p = 2,$ then $y = 6$. Find *y* if $w = 7, x = 4,$ and $p = 1$.

A. $y = \frac{12}{5}$

B. $y = \frac{168}{5}$

C. $y = \frac{121}{2}$

D. $y = \frac{5}{2}$

E. Cannot be determined.

5. Given the function, $f(x) = x^2 - x + 1$, find and simplify $\frac{f(a+h) - f(a)}{h}$ $(\text{assume } h \neq 0)$.

A. $\frac{h^2 - 2a + h + 2}{h}$

B. h

C. $2a + h$

D. $h - 1$

E. $2a + h - 1$

6. Solve the following system of equations for *x*:

$$\begin{cases} xy = 6 \\ 2x - y = 1 \end{cases}$$

A. $x = -\frac{3}{2}, \quad x = 2$

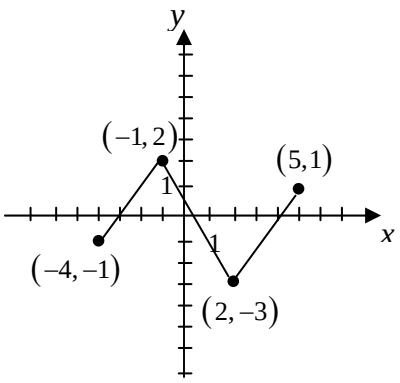
B. $x = -\frac{7}{2}, \quad x = 6$

C. $x = -2, \quad x = \frac{3}{2}$

D. $x = -6, \quad x = \frac{7}{2}$

E. $x = -\sqrt{\frac{7}{2}}, \quad x = \sqrt{\frac{7}{2}}$

Use the graph of $y = f(x)$ given below to answer questions #7 and #8:



7. Find the interval(s) for which f is increasing.

A. $[-3,1]$

B. $[-4,-1]\cup[1,5]$

C. $[-1,2]$

D. $[-4,-1]\cup[2,5]$

E. No intervals of increasing.

8. Find the domain, *D*, and range, *R*, of $y = 4f(x-1)$.

A. $D=[-3,6]$; $R=[-12,8]$

B. $D=[-3,20]$; $R=[-2,8]$

C. $D=[-5,4]$; $R=[-12,8]$

D. $D=[-4,5]$; $R=\left[-\frac{3}{4},\frac{1}{2}\right]$

E. $D=[-3,6]$; $R=\left[-\frac{3}{4},\frac{1}{2}\right]$

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

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

A. $(-5,-1)\cup(-1,3]$

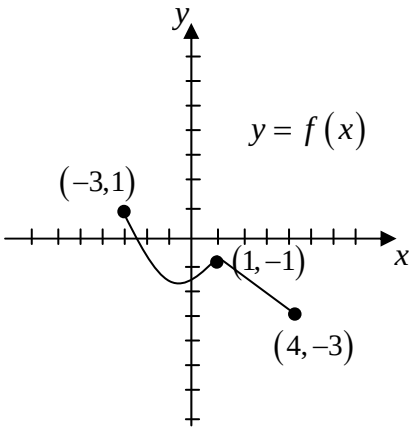
B. $(-5,-1)\cup[3,\infty)$

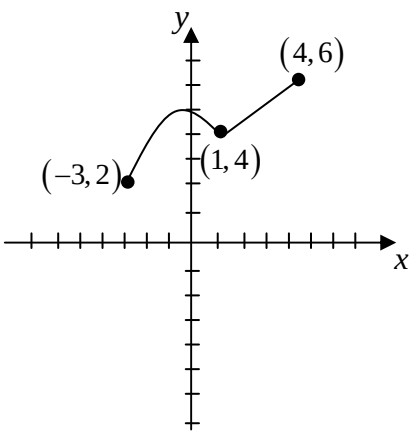
C. $(-\infty,-5)\cup(-1,3]$

D. $[3,\infty)$

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

10. 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. $y=-f(x+3)$

B. $y=f(-x)-3$

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

D. $y=-f(x)-3$

E. $y=-f(x)+3$

11. Find the standard equation of the parabola whose *x*-intercepts are -6 and 4 and the highest point has *y*-coordinate 8.

A. $y=-\frac{8}{25}(x+1)^2+8$

B. $y=-\frac{8}{9}(x-1)^2+8$

C. $y=-\frac{2}{9}(x+2)^2+8$

D. $y=-4(x+1)^2+8$

E. $y=-2(x-2)^2+8$

12. Find the maximum or minimum value of the parabola given by $f(x) = 4x^2 + 24x + 38$ and specify whether it is a maximum or minimum value.

A. -3; Maximum

B. 2; Minimum

C. -3; Minimum

D. 2; Maximum

E. Not enough information given.

13. Anthony enters a candy store equipped with \$2.10 to buy two kinds of his favorite candy, Gummi bears and jellybeans. Gummi bears sell for \$3.00 per pound and jellybeans sell for \$2.50 per pound. If he is to buy a total of 0.75 pounds of candy, find the system of equations that would be used to find the amount of each that should be purchased. Let *x* represent the number of pounds of Gummi bears and *y* the number of pounds of jellybeans.

A. $\begin{cases} x + y = 2.10 \\ 3.00x + 2.50y = 0.75 \end{cases}$

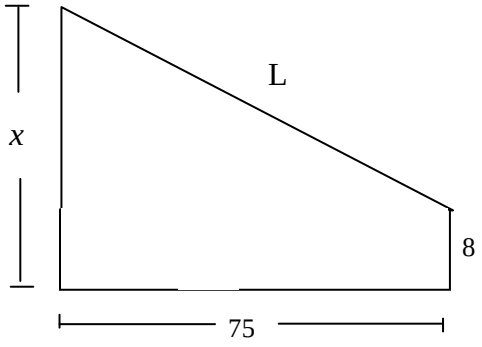
B. $\begin{cases} x + y = 0.75 \\ 3.00x + 2.50y = 0.75 \end{cases}$

C. $\begin{cases} x + y = 0.75 \\ 3.00x + 2.50y = 2.10 \end{cases}$

D. $\begin{cases} x + y = 2.10 \\ 3.00x + 2.50y = 2.10 \end{cases}$

E. None of the above.

14. Shown below is the apparatus for a zip line (where a person repels down a cable). The two poles are set 75 feet apart. The height of the longer pole is x and the height of the shorter pole is 8 feet. Express the length L of the cable as a function of x. Simplify the function.



A. $L(x)=\sqrt{x^2-16x+5689}$

B. $L(x)=\sqrt{x^2+5625}$

C. $L(x)=\sqrt{x^2+5689}$

D. $L(x)=x+75$

E. $L(x)=x+67$

15. A tour bus company charges \$30 per person up to and including the first 10 people and then \$25 per person for each additional person in the group. Find and simplify a piecewise-defined function, C, that specifies the total charge of a tour of x people.

A. $C(x)=\begin{cases}30x & \text{if } 0<x\le 10\\ 25x & \text{if } x>10\end{cases}$

B. $C(x)=\begin{cases}30x & \text{if } 0<x\le 10\\ 25x+10 & \text{if } x>10\end{cases}$

C. $C(x)=\begin{cases}30x & \text{if } 0<x\le 10\\ 25x+300 & \text{if } x>10\end{cases}$

D. $C(x)=\begin{cases}30x & \text{if } 0<x\le 10\\ 25x+50 & \text{if } x>10\end{cases}$

E. $C(x)=\begin{cases}30x & \text{if } 0<x\le 10\\ 25x+550 & \text{if } x>10\end{cases}$