.Use the functions $f(x) = x^2 - 3x$ and $g(x) = x - 5$ to answer questions #1 and #2:
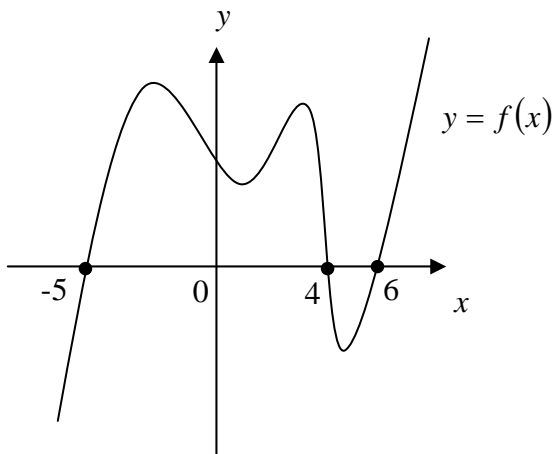
1. Find and simplify $(f - g)(-2)$.

                                                A. -17

                                                B. 5

                                                C. 17

                                                D. 13

                                                E. None of the above

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

                                                A. $x^2 - 13x + 40$

                                                B. $x^3 - 8x^2 + 15x$

                                                C. $x^2 - 3x + 40$

                                                D. $x^3 - 3x^2 - 5x$

                                                E. $x^2 - 2x - 5$

3. Which of the following sign charts describes the graph of the function $y = f(x)$ given below.

A. sign of $f(x)$ $+$ | $+$ | $-$ | $+$ -5 4   6

B. sign of $f(x)$ $-$ | $+$ | $+$ | $-$ -5 4   6

C. sign of $f(x)$ $+$ | $-$ | $+$ | $-$ -5 4   6

D. sign of $f(x)$ $-$ | $+$ | $-$ | $+$ -5 4   6

E. sign of $f(x)$ $-$ | $-$ | $+$ | $-$ -5 4   6

4. If the point $P(-2,3)$ is on the graph of $y = f(x)$, find the corresponding point on the graph of $y = f(4x)+1$.

    A. $\left(-\dfrac{1}{2},4\right)$

    B. $\left(-\dfrac{1}{2},2\right)$

    C. $(-8,4)$

    D. $(-8,2)$

    E. None of the above.

5. Solve the following system of equations for y.
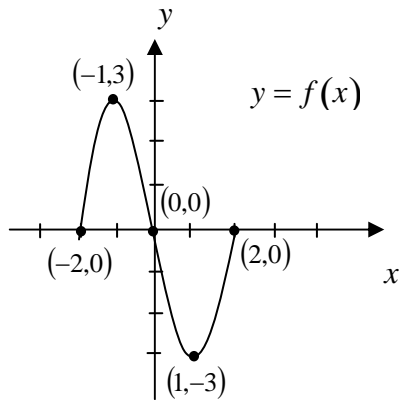
$$\begin{cases} x^2 + y^2 = 25 \\ x^2 - y = 5 \end{cases}$$

    A. $y = 0,\ y = 3$

    B. $y = 0,\ y = 4$

    C. $y = -4,\ y = 5$

    D. $y = -3,\ y = 3$

    E. $y = -5,\ y = 4$

6. Suppose y is directly proportional to the square root of x and inversely proportional to the product of v and w. If $x=36$, $v=2$ and $w=1$, then $y=9$. Find the constant of proportionality, k.

    A. $k = \dfrac{1}{3}$

    B. $k = 3$

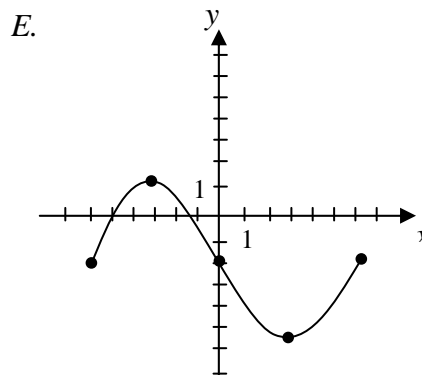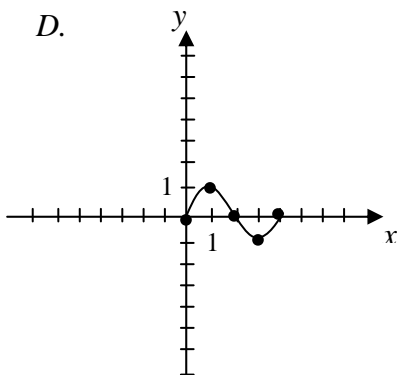   C. $k = \dfrac{1}{2}$

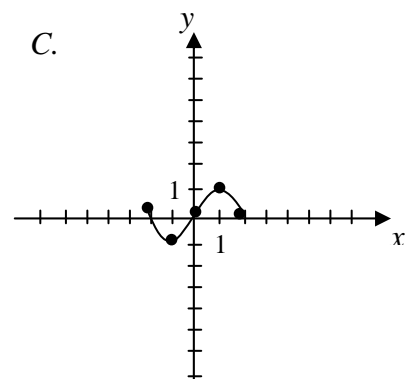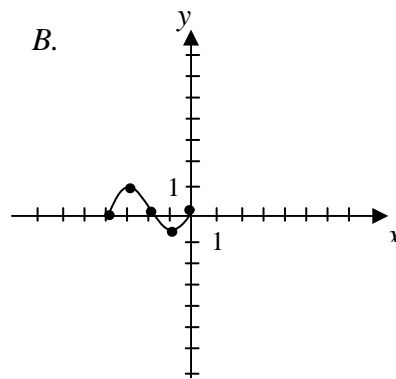   D. $k = 2$

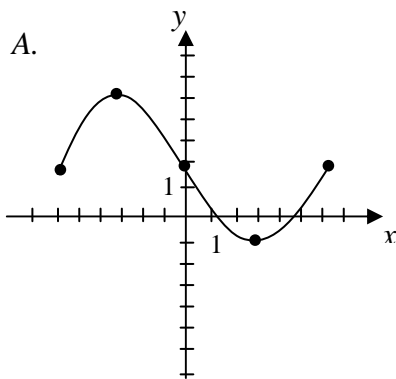   E. None of the above

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

7. Find the interval(s) for which f is increasing. Express your answer in interval notation.

A. $[-2,-1] \cup [1,2]$

B. $[-2,-1] \cup [0,1]$

C. $[-1,1]$

D. $[-2,0] \cup [1,2]$

E. $[-2,2]$

8. Choose the graph that depicts the graph of $y = \dfrac{1}{3} f(x + 2)$.

A.

B.

C.

D.

E.

9. Find a linear function such that $f(1)=5$ and $f(2)=9$.

A. $y = 4x - 19$

B. $y = \dfrac{1}{4}x + 5$

C. $y = 4x + 1$

D. $y = \dfrac{1}{4}x - \dfrac{1}{4}$

E. None of the above.

10. Find the standard equation of the parabola with vertical axis whose vertex is $V(-2,-1)$ and passes through the point $(-4,5)$.

A. $y = \dfrac{1}{7}(x-2)^2 - 1$

B. $y = \dfrac{5}{3}(x+2)^2 - 1$

C. $y = \dfrac{1}{6}(x-2)^2 - 1$

D. $y = -\dfrac{3}{49}(x+2)^2 - 1$

E. $y = \dfrac{3}{2}(x+2)^2 - 1$

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

$(x-2)(x+3)(x-1) \le 0$

A. $(-\infty,-3] \cup [2,\infty)$

B. $[-3,1] \cup [2,\infty)$

C. $(-\infty,-3] \cup [1,2]$

D. $[1,2]$

E. None of the above

12. Express the parabola $f(x) = 2x^2 - 8x - 1$ in standard form.

            A. $y = 2(x-4)^2 + 15$

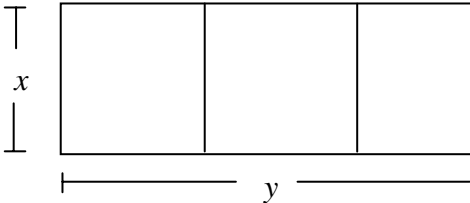   B. $y = 2(x-2)^2 - 9$

            C. $y = 2(x-2)^2 + 7$

            D. $y = 2(x-4)^2 - 17$

            E. None of the above.

13. A farmer has 3000 feet of fence to enclose a rectangular field and subdivide it into three rectangular plots (see the figure). If x denotes the width of the field and y the length, find the value of x so that the total area of the field is maximized.

            A. $x = 250$ feet

            B. $x = 750$ feet

            C. $x = 1000$ feet

            D. $x = 375$ feet

            E. Not enough information given.

14. A helicopter lifts off the ground vertically at a rate of 6 meters/second. A person is standing at a point 75 meters away due west of the point at which the helicopter took off. If t denotes the time (in seconds) since the helicopter lifted off, express the distance, d, between the helicopter and the person as a function of t. Simplify the function.

            A. $d(t) = 6t + 75$

            B. $d(t) = \sqrt{6t + 75}$

            C. $d(t) = \sqrt{6t^2 + 5625}$

            D. $d(t) = \sqrt{36 + 5625t^2}$

            E. $d(t) = \sqrt{36t^2 + 5625}$

15. A tour bus company charges fares based on the number of people in a group. For one particular trip, the company charges \$30 per person for a group of 25 people or less. For each additional person above 25, the company charges \$28 per person. Let C be the total charge for the trip and x the number of people. Express C as a function of x. Simplify the function.

A. $C(x) = \begin{cases} 30x & \text{if } x \le 25 \\ 28x + 50 & \text{if } x > 25 \end{cases}$

B. $C(x) = \begin{cases} 30x & \text{if } x \le 25 \\ 58x & \text{if } x > 25 \end{cases}$

C. $C(x) = \begin{cases} 30x & \text{if } x \le 25 \\ 28x & \text{if } x > 25 \end{cases}$

D. $C(x) = \begin{cases} 30x & \text{if } x \le 25 \\ 28x + 750 & \text{if } x > 25 \end{cases}$

E. $C(x) = \begin{cases} 30x & \text{if } x \le 25 \\ 58x - 25 & \text{if } x > 25 \end{cases}$