1. Given $f(x) = \dfrac{x^2}{x+1}$ and $g(x) = 3x - 4$, find and simplify $(f - g)(2)$.

          A. -9

          B. $-\dfrac{2}{3}$

          C. -1

          D. $-\dfrac{26}{3}$

          E. None of the above

2. Find the domain of the function $g(x) = \dfrac{\sqrt{x+3}}{x^2 - 36}$.

          A. $[-3,6) \cup (6,\infty)$

          B. $(-\infty,-6) \cup (-6,6) \cup (6,\infty)$

          C. $(-6,-3) \cup (-3,6)$

          D. $(-\infty,-6) \cup (-6,-3]$

          E. None of the above

3. If \$7500 is invested at a rate of 8% compounded quarterly, find the amount earned after 13 years. Round your answer to the nearest dollar. $A = P\left(1 + \dfrac{r}{n}\right)^{nt}$

          A. \$20,932

          B. \$20,397

          C. \$21,002

          D. \$18,490

          E. None of the above

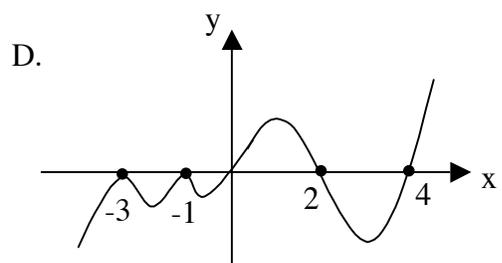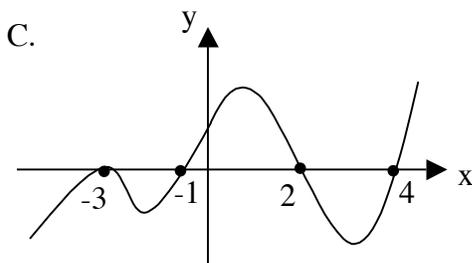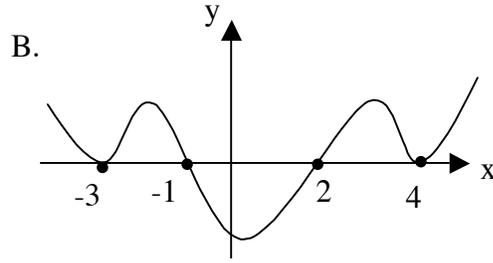4. Find the vertex of the parabola given by $f(x) = 2x^2 + 12x + 11$.

          A. $(-3,2)$

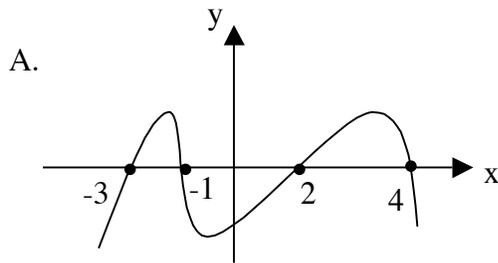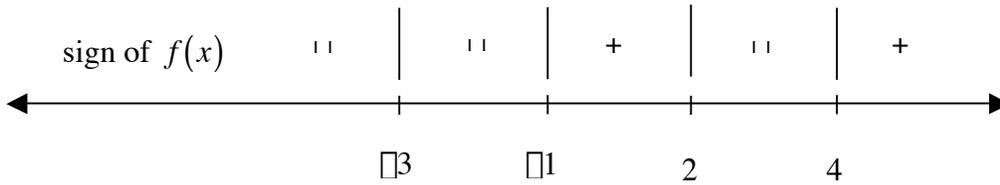   B. $(3,-7)$

          C. $(3,2)$

          D. $(-3,-7)$

          E. None of the above

5. Given below is the sign chart for a function. Which of the following could be the graph of the function?

sign of $f(x)$ $-$ $\big|$ $-$ $\big|$ $+$ $\big|$ $-$ $\big|$ $+$

-3 -1 2 4

A.

B.

C.

D.

E. None of these

6. Solve the following system of equations for y.

$$\begin{cases} 3x - 4y = 5 \\ 2x - 3y = 1 \end{cases}$$
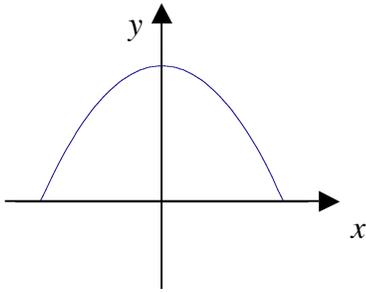
A. $y = 7$

B. $y = 11$
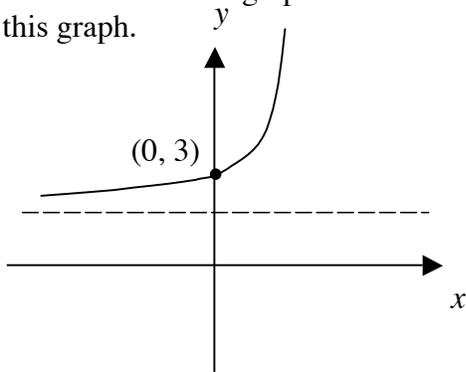
C. $y = 19$

D. $y = -\dfrac{13}{17}$

E. None of the above

7. A doorway has the shape of a parabola. It is 10 feet wide at the base and 8 feet high at the center (see the figure below). Find the standard equation for the shape of the doorway.

A. $y = -x^2 + 8$

B. $y = -\dfrac{5}{64}x^2$

C. $y = -5x^2 + 8$

D. $y = -8x^2$

E. $y = -\dfrac{8}{25}x^2 + 8$

8. Given below is the graph of a natural exponential function. Choose the function that corresponds to this graph.

A. $f(x) = e^x + 2$

B. $f(x) = e^{x+2}$

C. $f(x) = e^x + 3$

D. $f(x) = e^{2x}$

E. $f(x) = 3e^x$

9. Given that the point $P(-3,8)$ is on the graph of $y = f(x)$, find the corresponding point on the graph of $y = \dfrac{1}{2}f(x+5) - 3$.

A. $(-8,1)$

B. $\left(2,\dfrac{5}{2}\right)$

C. $(2,1)$

D. $\left(-8,\dfrac{5}{2}\right)$

E. None of the above

10. Given $f(x) = 2x^2 + x - 5$ and $g(x) = 3x$, find and simplify $(f \circ g)(x)$.

A. $6x^2 + 3x - 15$

B. $18x^2 + x - 5$

C. $6x^3 + 3x^2 - 15x$

D. $18x^2 + 3x - 5$

E. None of the above

11. How many times do the graphs of the equations given below intersect each other?

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

          A. One

          B. Two

          C. Three

          D. Four

          E. The graphs do not intersect

12. Given the function $f(x) = \sqrt{x+5}$, find the inverse function, f^{-1}.

     A. $f^{-1}(x) = \dfrac{1}{\sqrt{x+5}}; \quad x \geq 0$

     B. $f^{-1}(x) = \sqrt{x+5}; \quad x \geq 0$

     C. $f^{-1}(x) = x^2 - 5; \quad x \geq 0$

     D. $f^{-1}(x) = x - 5; \quad x \geq 0$

     E. $f^{-1}(x) = \dfrac{1}{x^2 - 5}; \quad x \geq 0$

13. The attendance at a home high school football game in a certain county is directly proportional to the product of the temperature one hour before kick-off time and the number of students in the senior class, and inversely proportional to the square of the number of losses for the home team. If the temperature one hour before kick-off was 64 degrees, the senior class consisted of 135 students, and the home team had 6 losses, then the attendance at the home game was 120 people. Find the attendance if the temperature one hour before kick-off is 68 degrees, the senior class has 150 students, and the home team has 5 losses.

          A. 408 people

          B. 130 people

          C. 204 people

          D. 155 people

          E. None of the above

14. A compact disc distributor charges retailers based upon the number of CD's ordered. The distributor charges $10 per CD on the first 300 CD's ordered and $8 per CD on any additional CD's ordered beyond the first 300. Let x represent the number of CD's ordered and T represent the total charge. Find a piecewise defined function that fits this data. Simplify the function.

A. $T(x) = \begin{cases} 10x & \text{if } 0 \le x \le 300 \\ 8x & \text{if } x > 300 \end{cases}$

B. $T(x) = \begin{cases} 10x & \text{if } 0 \le x \le 300 \\ 8x + 600 & \text{if } x > 300 \end{cases}$

C. $T(x) = \begin{cases} 10x & \text{if } 0 \le x \le 300 \\ 8x - 2400 & \text{if } x > 300 \end{cases}$

D. $T(x) = \begin{cases} 10x & \text{if } 0 \le x \le 300 \\ 8x + 400 & \text{if } x > 300 \end{cases}$

E. $T(x) = \begin{cases} 10x & \text{if } 0 \le x \le 300 \\ 8x + 3000 & \text{if } x > 300 \end{cases}$

15. Two children leave the same point walking at the same time. The boy walks north at a rate of 2 m/sec. and the girl walks east at a rate of 3 m/sec. If t represents the number of seconds since they left, express the distance, d, between them as a function of t. Do not simplify.

A. $d(t) = (2t)^2 + (3t)^2$

B. $d(t) = \sqrt{2t + 3t}$

C. $d(t) = 2t + 3t$

D. $d(t) = \sqrt{(2t)^2 + (3t)^2}$

E. None of the above