COLLEGE ALGEBRA: FINAL EXAM - FALL 2005

1. Solve by factoring: $2x^2 + 3x = -1$

   a. $-1, \frac{-1}{2}$ b. $-1, \frac{1}{2}$ c. $1, \frac{-1}{2}$ d. $1, \frac{1}{2}$

2. Solve $\sqrt{x+4} + 2 = -x$

   a. -3 b. 0 c. 5 d. 5, -3

3. Solve the equation $\frac{2}{c} - 3 = \frac{-4}{7}$

   a. $1\frac{3}{14}$ b. $\frac{7}{15}$ c. $\frac{14}{17}$ d. $2\frac{1}{7}$

4. Find the vertex of the graph of the function $f(x) = (x-4)^2 + 2$

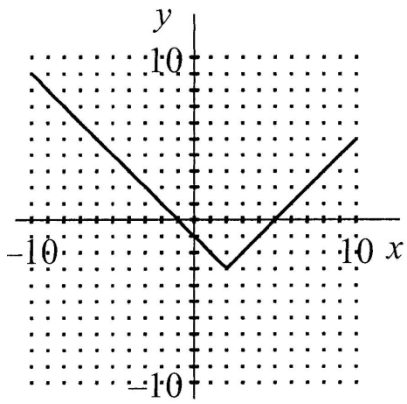
   a. (-4, 2) b. (4, 2) c. (4, -2) d. (-4, -2)

5. Find the domain and range of the function: $f(x) = -7x^2 + 2$

   a. Domain: $(-\infty, \infty)$; Range: $(-\infty, 2]$
   b. Domain: $[2, \infty)$; Range: $(-\infty, \infty)$
   c. Domain: $(-\infty, \infty)$; Range: $[2, \infty)$
   d. Domain: $(-\infty, 2]$; Range: $(-\infty, \infty)$

6. Use the graph of $f(x)=|x|$ to identify the graph of $f(x)=|x-2|-3$

[A]



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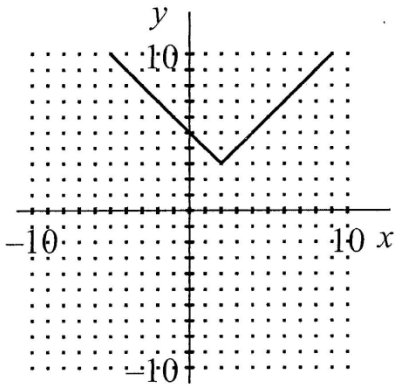

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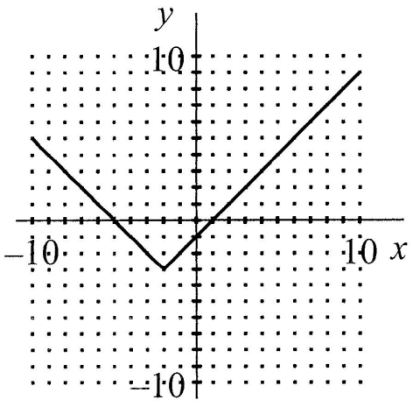
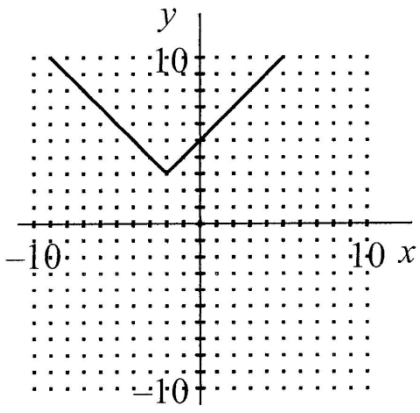


[D]



7. Given $f(x)=\dfrac{3}{x+3}$ and $g(x)=\dfrac{7}{x-7}$, find $(f+g)(x)$

[A] $\dfrac{10}{2x-4}, x \neq 2$

[B] $\dfrac{10x}{(x+3)(x-7)}, x \neq -3,7$

[C] $-\dfrac{4}{2x-4}, x \neq 2$

[D] $\dfrac{-10x}{(x+3)(x-7)}, x \neq -3,7$

8. Find all relative extrema of the function. $f(x) = 2x^3 + x^4$

[A] relative maximum: none
relative minimum: $\left(\frac{-3}{2}, \frac{-27}{16}\right)$

[B] relative maximum: $\left(\frac{3}{2}, \frac{27}{16}\right)$
relative minimum: $(0,0)$

[C] relative maximum: $\left(\frac{-3}{2}, \frac{-27}{16}\right)$
relative minimum: none

[D] The function has no relative extrema

9. Find all the zeros of the function. $f(x) = x^3 + 6x^2 + 8x - 3$

[A] $-3+\sqrt{13}, -3-\sqrt{13}$

[B] $-3, \frac{-3+\sqrt{13}}{2}, \frac{-3-\sqrt{13}}{2}$

[C] $-3, \frac{2+\sqrt{7}}{2}, \frac{2-\sqrt{7}}{2}$

[D] none of these

10. Which of the following rational functions has a graph with a slant asymptote?

[A] $f(x) = \frac{7-x}{x-7}$

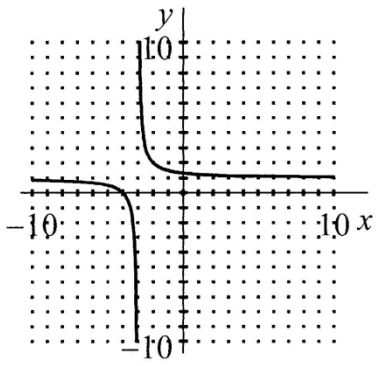
[B] $f(x) = \frac{-9x^6 + 3x^3 + 5}{4x^5 + 9x^3 + 8}$

[C] $f(x) = \frac{4x^5 + 9x^3 + 8}{-9x^6 + 3x^3 + 5}$

[D] $f(x) = \frac{(-x^3 - 3)^2}{-9x^6 + 3x^3 + 5}$

11. Graph: $f(x) = \dfrac{x-3}{x^2 - 8x + 15}$

[A]



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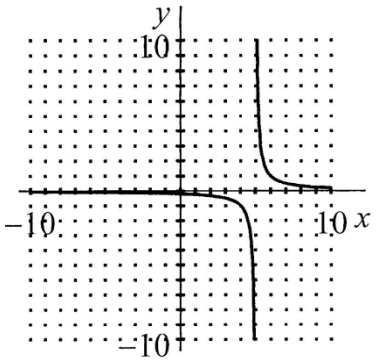

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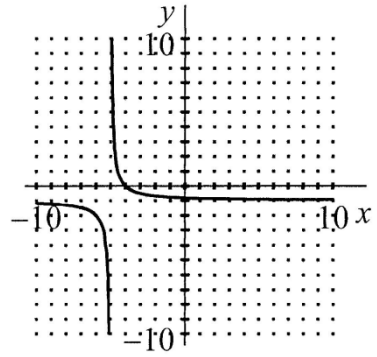

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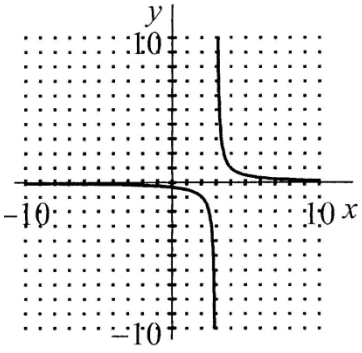


12. Find the inverse of the function. $f(x) = (x+3)^3 - 3$

[A] $f^{-1}(x) = \sqrt[3]{x+6}$

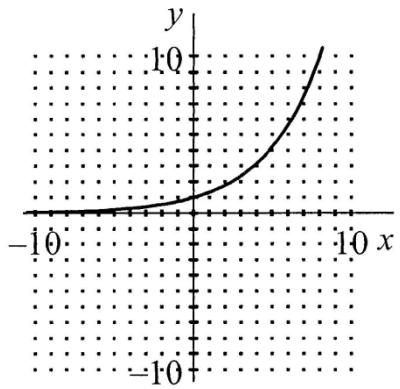
[B] $f^{-1}(x) = \sqrt[3]{x+3} - 3$

[C] $f^{-1}(x) = \sqrt[3]{x-3} + 3$

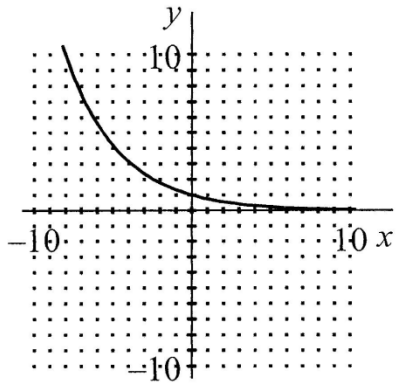
[D] None of these

13. Identify the graph of the function. $f(x) = \left(\frac{4}{3}\right)^x$

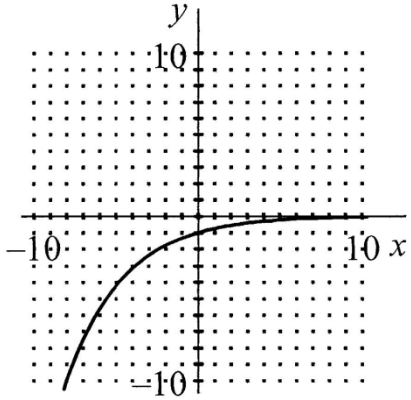
[A]



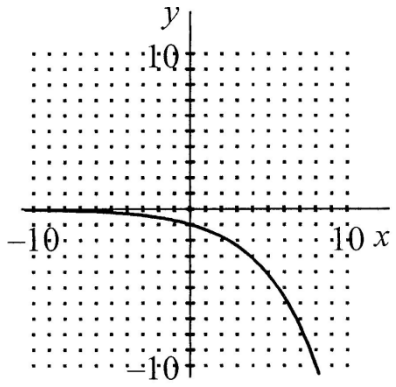
[B]



[C]

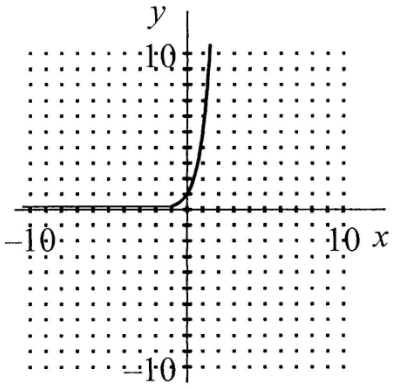


[D]

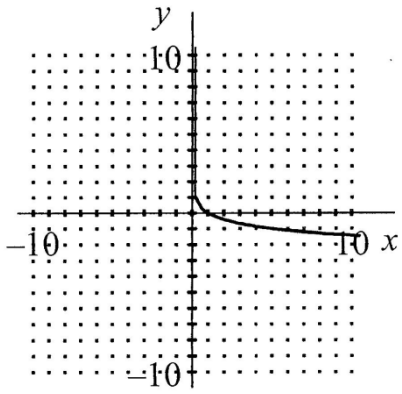


14. Identify the graph of the logarithmic function. $f(x) = \log_5 x$

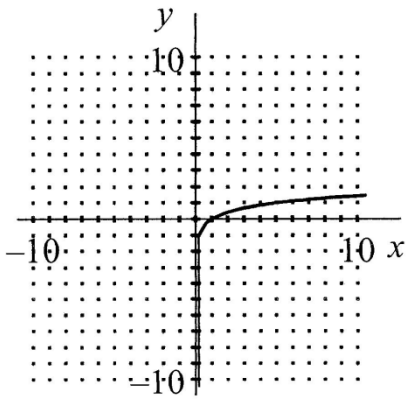
[A]



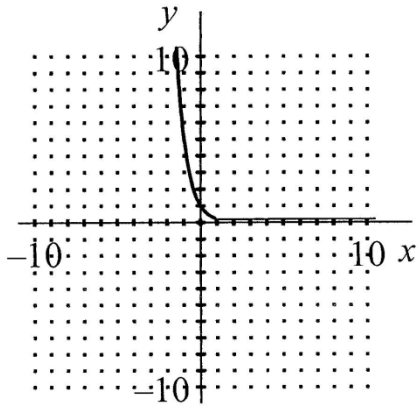
[B]



[C]



[D]



15. The formula $A = 1000e^{rt}$ can be used to find the dollar value of an investment of $1000 after t years when the interest is compounded continuously at a rate of r percent.

a. Find the value of the investment after 10 years if the interest rate is 4%.

b. Find the value of the investment after 5 years if the interest rate is 5%.

[A] $a.\ \$1491.82$ $b.\ \$1284.03$

[B] $a.\ \$1605.57$ $b.\ \$1368.37$

[C] $a.\ \$1491.82$ $b.\ \$1368.37$

[D] $a.\ \$1605.57$ $b.\ \$1284.03$

16. Solve. $\begin{cases} 2x - 3y - 2z = 17 \\ 4x + 3y + z = -8 \\ x - 3y + 2z = 4 \end{cases}$

[A] (2, -3, 3) [B] (1, -3, -3) [C] (2, -3, 2) [D] (3a-5, 4a+6, a)

17. Solve the system of equations using substitution.

$$x^2 + y^2 = 17$$
$$x + 3y = 7$$

[A] $(4,1), \left(\frac{-13}{5}, \frac{16}{5}\right)$

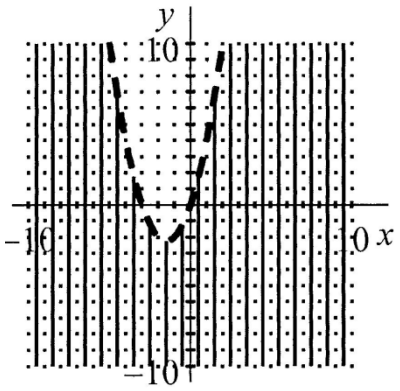
[B] $\left(4, \frac{-17}{5}\right), \left(4, \frac{17}{5}\right)$

[C] $(4,1), \left(\frac{-17}{5}, \frac{17}{5}\right)$

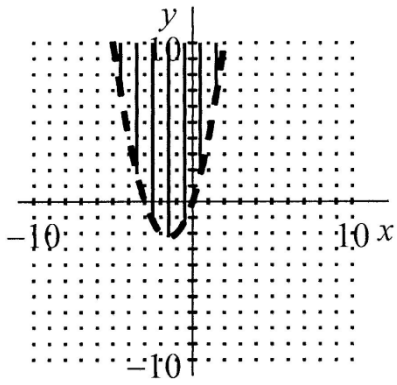
[D] $\left(4, \frac{16}{5}\right), \left(\frac{-13}{5}, 1\right)$

18. Identify the graph of the inequality. $y \le x^2 + 3x$

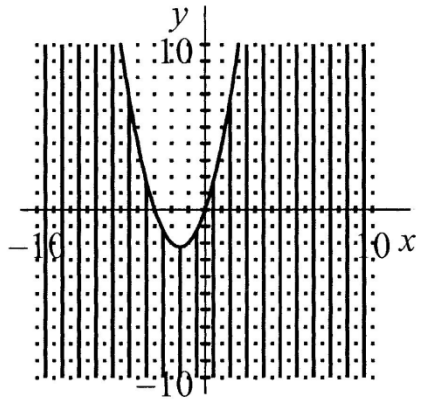
[A]



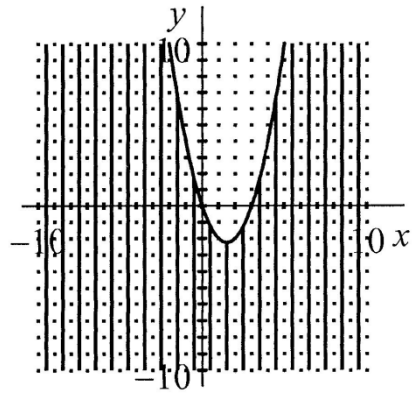
[B]



[C]



[D]



19. Evaluate the expression. $A+B$

$$A=\begin{bmatrix}-5 & 1 & -9\\ -8 & -3 & -1\\ -6 & -4 & -2\end{bmatrix},\quad B=\begin{bmatrix}-8 & -5 & -4\\ -2 & -6 & -1\\ -3 & -7 & 1\end{bmatrix}$$

[A] $\begin{bmatrix}-13 & -4 & -13\\ -10 & -9 & -1\\ -9 & -11 & -2\end{bmatrix}$

[B] $\begin{bmatrix}3 & 6 & -5\\ -6 & 3 & 0\\ -3 & 3 & -3\end{bmatrix}$

[C] $\begin{bmatrix}3 & 6 & -5\\ -6 & 3 & -3\\ -3 & 3 & 0\end{bmatrix}$

[D] $\begin{bmatrix}-13 & -4 & -13\\ -10 & -9 & -2\\ -9 & -11 & -1\end{bmatrix}$

20. Evaluate the expression. $A-B$

$$A=\begin{bmatrix}0 & -6 & -8\\ -7 & -9 & -1\\ 0 & -7 & -3\end{bmatrix},\quad B=\begin{bmatrix}2 & -2 & -7\\ -9 & -3 & 2\\ 0 & -1 & -8\end{bmatrix}$$

[A] $\begin{bmatrix}2 & -8 & -15\\ -16 & -12 & 1\\ 0 & -8 & -11\end{bmatrix}$

[B] $\begin{bmatrix}-2 & -4 & -1\\ 2 & -6 & -3\\ 0 & -6 & 5\end{bmatrix}$

[C] $\begin{bmatrix}-2 & -4 & -1\\ 2 & -6 & 5\\ 0 & -6 & -3\end{bmatrix}$

[D] $\begin{bmatrix}2 & -8 & -15\\ -16 & -12 & -11\\ 0 & -8 & 1\end{bmatrix}$

21. Find the product, if possible

$$BA, \ \ if \ \ A=\begin{bmatrix}-3 & -5 & -2\\ 4 & -1 & 1\\ -2 & 5 & -3\end{bmatrix}, \ \ B=\begin{bmatrix}4 & 3 & -2\\ -4 & 1 & -5\\ 5 & -2 & -3\end{bmatrix}$$

[A] $\begin{bmatrix}-12 & -15 & 4\\ -16 & -1 & -5\\ -10 & -10 & 9\end{bmatrix}$

[B] $\begin{bmatrix}-12 & 12 & 4\\ 20 & -1 & -25\\ -10 & -2 & 9\end{bmatrix}$

[C] $\begin{bmatrix}4 & -33 & 1\\ 26 & -6 & 24\\ -17 & -38 & -3\end{bmatrix}$

[D] $\begin{bmatrix}-2 & -10 & 37\\ 25 & 9 & -6\\ -43 & 5 & -12\end{bmatrix}$

22. Determine whether or not matrix B is the inverse of matrix A

$$A=\begin{bmatrix}-7 & -6\\ -9 & -2\end{bmatrix}, \ \ B=\begin{bmatrix}-3/20 & -3/40\\ -1/5 & 3/40\end{bmatrix}$$

[A] $AB=\begin{bmatrix}9/4 & 3/40\\ 7/4 & 21/40\end{bmatrix}$

B is not the inverse of A

[B] $AB=\begin{bmatrix}1 & 0\\ 0 & 1\end{bmatrix} \ \ and \ \ BA=\begin{bmatrix}1 & 0\\ 0 & 1\end{bmatrix}$

B is not the inverse of A

[C] $AB=\begin{bmatrix}1 & 0\\ 0 & 1\end{bmatrix} \ \ and \ \ BA=\begin{bmatrix}1 & 0\\ 0 & 1\end{bmatrix}$

B is the inverse of A

[D] $AB=\begin{bmatrix}9/4 & 3/40\\ 7/4 & 21/40\end{bmatrix}$

B is the inverse of A

23. Find the determinant of the matrix.

$$\begin{bmatrix}4 & 6\\ -1 & -5\end{bmatrix}$$

[A] 14 [B] -6 [C] 6 [D] -14

24. Use Cramer's Rule to solve (if possible) the system of equations.

$$\begin{cases} 2x + y = 10 \\ 4x - 3y = 6 \end{cases}$$

[A] $\left(\frac{14}{5}, \frac{18}{5}\right)$ [B] $\left(\frac{12}{5}, \frac{-26}{5}\right)$ [C] $\left(\frac{18}{5}, \frac{14}{5}\right)$ [D] $\left(\frac{-26}{5}, \frac{12}{5}\right)$

25. Find all real zeros of the function. $f(x) = x^3 + 8x^2 + 5x - 14$

[A] $x = 1, x = -2, x = -7$ [B] $x = -1, x = -2, x = -7$

[C] $x = -1, x = 2, x = -7$ [D] $x = 1, x = 2, x = -7$

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1. A
2. A
3. C
4. B
5. A
6. A
7. B
8. A
9. B
10. B
11. B
12. B
13. A
14. C
15. A
16. B
17. A
18. C
19. D
20. B
21. C
22. A
23. D
24. C
25. A