COLLEGE ALGEBRA: FINAL EXAM - FALL 2003

1. Find an equation of the line that passes through the point (1, -1) and has a slope of -3

   a. $y = -3x + 4$
   b. $y = -3x - 2$
   c. $y = -3x - 1$
   d. None of these
   e. $y = -3x + 2$

2. Given $f(x) = \begin{cases} x^2 + 1, x < 4 \\ 6x - 7, x \geq 4 \end{cases}$, find $f(-2)$

   a. None of these
   b. 5
   c. -5
   d. -19
   e. 4

3. Given $f(x) = x + 4$ and $g(x) = 3x$, find $(f \circ g)(2)$

   a. 16
   b. 36
   c. 10
   d. 32
   e. None of these

4. Given $f(x) = 5x - 2$, find $f^{-1}(x)$

   a. None of these
   b. $\frac{x+2}{5}$
   c. $\frac{x}{5} + 2$
   d. $5x + 2$
   e. $\frac{1}{5x-2}$

5. Determine which of the following is a solution of the equation

$$2(1-x)-(4x+3)=11$$

a. 1
b. -3
c. -2
d. None of these
e. 2

6. Use a graphing utility to approximate the solution(s) of $x^3 - x + 9 = 0$

a. None of these
b. -4.25
c. -2.25
d. 9.00
e. -1.75

7. Multiply: $\left(2-\sqrt{-25}\right)(4+3i)$

a. $-7-14i$
b. $8-15i$
c. $28+2i$
d. None of these
e. $23-14i$

8. Solve: $3x^2 - 6x + 2 = 0$

a. $\dfrac{3\pm\sqrt{15}}{3}$
b. $\dfrac{3\pm\sqrt{3}}{3}$
c. $\dfrac{1}{3},2$
d. $1\pm\sqrt{3}$
e. None of these

9. Find the number of units that produce a maximum revenue, $R = 95x - 0.1x^2$, where R is the total revenue in dollars and x is the number of units sold.

a. 550
b. 371
c. 475
d. None of these
e. 716

10. Find a polynomial function with zeros: 1, 0, -3

a. $f(x) = (x-1)(x+3)^2$
b. $f(x) = x(x-3)(x-1)$
c. $f(x) = x(x-3)^3(x+1)^2$
d. None of these
e. $f(x) = x^2(x-1)(x+3)$

11. Divide: $(2x^3 + 3x^2 - 19x - 1) \div (x+4)$

a. $2x^2 - 5x + 1 - \dfrac{5}{x+4}$
b. $2x^2 - 5x + 1 - \dfrac{3}{x+4}$
c. $2x^2 + 11x + 25 + \dfrac{99}{x+4}$
d. None of these
e. $2x^2 - x - 15 + \dfrac{54}{x+4}$

12. Find a third degree polynomial with real coefficients that has zeros: 6 and -2i

a. $x^3 - 6x^2 + 2x - 12$
b. $x^3 + 6x^2 + 4x + 24$
c. $x^3 - 6x^2 + 4x - 24$
d. $x^3 + 6x^2 + 2x + 12$
e. None of these

13. Find the vertical asymptote(s): $f(x) = \dfrac{1}{(x+2)(x-5)}$

a. $x = -2, x = 5$
b. None of these
c. $y = 1$
d. $y = 0$
e. $y = 1, y = 0$

14. $3500 is invested at a rate of $4\frac{1}{2}\%$ compounded continuously. What is the balance at the end of 10 years?

a. $5489.09
b. $5472.45
c. $315,059.96
d. None of these
e. $5221.39

15. Write in exponential form: $\log_7 b = 12$

a. $7^{12} = b$
b. None of these
c. $7^b = 12$
d. $b^7 = 12$
e. $b^{12} = 7$

16. Evaluate $\log_7 15$ using the change of base formula

a. None of these
b. 2.1429
c. 12.6765
d. 1.3917
e. 0.7186

17. Solve for x: $\ln e^{2x+1} = 9$

a. 4
b. $\dfrac{-1+\ln 9}{2}$
c. $\dfrac{9}{2\ln e} - \dfrac{1}{2}$
d. 23
e. None of these

18. An initial deposit of $4000 is made in a savings account for which the interest is compounded continuously. The balance will triple in 15 years. What is the annual rate of interest for this account?

a. 8.2%
b. 7.3%
c. None of these
d. 7.9%
e. 6.2%

19. If the total cost of running a business is given by the equation $C = 4.16x + 75{,}000$ and the revenue is given by the equation $R = 7.91x$, find the sales x necessary to break even.

a. 6214
b. 200
c. 20,000
d. None of these
e. 9482

20. Solve the following system of linear equations for x:

$$x + 2.5y = 900$$
$$5x - 2y = 150$$

a. None of these
b. 150
c. 0
d. 900
e. 300

21. Find the solution to the system of linear equations with the augmented matrix:

$$\left[\begin{array}{ccc:c} 1 & 2 & -1 & 4 \\ 0 & 2 & 1 & -3 \\ 0 & 0 & 2 & -4 \end{array}\right]$$

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

b. $(4, -3, -4)$

c. $(1, 2, -1)$

d. $\left(10, \frac{-5}{2}, -2\right)$

e. None of these

22. Find AB if $A = \begin{bmatrix} 2 & -1 & 0 \\ 3 & 4 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} 0 & 1 \\ 4 & 3 \\ 5 & -1 \end{bmatrix}$

a. $\begin{bmatrix} 3 & 4 & 1 \\ 17 & 8 & 3 \\ 7 & -9 & -1 \end{bmatrix}$

b. Impossible

c. None of these

d. $\begin{bmatrix} -4 & -1 \\ 21 & 14 \end{bmatrix}$

e. $\begin{bmatrix} -2 & -1 \\ 21 & 14 \end{bmatrix}$

23. Given $A = \begin{bmatrix} 5 & 1 \\ -2 & 3 \end{bmatrix}$, find A^{-1}

a. None of these

b. $\begin{bmatrix} 85 & 17 \\ 34 & 51 \end{bmatrix}$

c. $\begin{bmatrix} -2/5 & 1/3 \\ 3/2 & -1/2 \end{bmatrix}$

d. $\begin{bmatrix} 5/17 & 1/17 \\ -2/17 & 3/17 \end{bmatrix}$

e. $\begin{bmatrix} 3/17 & -1/17 \\ 2/17 & 5/17 \end{bmatrix}$

24. Find the determinant of the matrix: $\begin{bmatrix} 5 & -1 & 0 & 2 \\ 0 & 4 & 7 & 3 \\ 0 & 0 & 1 & 1 \\ 0 & 0 & 0 & 1 \end{bmatrix}$

a. -11

b. None of these

c. -20

d. 20

e. 11

25. Use Cramer's Rule to solve for y in the system of linear equations:

$$\begin{cases} 3x+2y+4z=12 \\ x-y+z=3 \\ 2x+7y-z=9 \end{cases}$$

a. $y=\dfrac{\begin{vmatrix} 3 & 12 & 4 \\ 1 & 3 & 1 \\ 2 & 9 & -1 \end{vmatrix}}{\begin{vmatrix} 3 & 2 & 4 \\ 1 & -1 & 1 \\ 2 & 7 & -1 \end{vmatrix}}$

b. $y=\begin{vmatrix} 3 & 2 & 4 \\ 1 & -1 & 1 \\ 2 & 7 & -1 \end{vmatrix}\begin{vmatrix} 2 & 4 & 12 \\ -1 & 1 & 3 \\ 7 & -1 & 9 \end{vmatrix}$

c. $y=\dfrac{\begin{vmatrix} 3 & 4 & 12 \\ 1 & -1 & 3 \\ 2 & 7 & 9 \end{vmatrix}}{\begin{vmatrix} 2 & 4 & 3 \\ -1 & 1 & 1 \\ 7 & -1 & 2 \end{vmatrix}}$

d. None of these

e. $y=\dfrac{\begin{vmatrix} 3 & 2 & 4 \\ 1 & -1 & 1 \\ 2 & 7 & -1 \end{vmatrix}}{\begin{vmatrix} 3 & 12 & 4 \\ 1 & 3 & 1 \\ 2 & 9 & -1 \end{vmatrix}}$

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1. e
2. b
3. c
4. b
5. c
6. c
7. e
8. b
9. c
10. e
11. a
12. c
13. a
14. a
15. a
16. d
17. a
18. b
19. c
20. b
21. a
22. d
23. e
24. d
25. a