

NAME: _____ Score _____ /100
Please print

SHOW ALL YOUR WORK IN A NEAT AND ORGANIZED FASHION

1 pt. each for 1 – 20. 4 pts. each for all others unless otherwise noted.

Circle T or F, whichever is correct.

1. T F The functions \ln and \log are inverses.
2. T F $\ln(x + y) = \ln(x) + \ln(y)$.
3. T F $\det(AB) = \det(A)\det(B)$.
4. T F The rule for \exp_5 is $\exp_5(x) = x^5$.
5. T F Two systems of equations are equivalent if they have the same solution sets.
6. T F Every square matrix has an inverse.
7. T F The solution of a system of three equations in three variables is an ordered pair of numbers.
8. T F The graph of \ln is entirely above the x -axis.
9. T F The point $(0, 0)$ is in the solution set for the inequality $3x + 2y > -7$.
10. T F $\ln \circ \exp(3x + 7) = 3x + 7$

Fill in each of the blanks to make the statements true.

11. A system S of equations consists of two linear equations in two variables. If the linear equations have different slopes, how many solutions does the System S have? _____
12. The domain of \ln is _____.
13. To find the point or points where the line $x - y = 2$ intersects the circle $x^2 + y^2 = 16$ it is necessary to solve the system of equations $\left\{ \begin{array}{l} \text{_____} \\ \text{_____} \end{array} \right.$
14. The rule for the exponential function base e is _____.
15. The zero of the \ln function is _____.
16. The equation of the boundary line for the inequality $2x + 3y < 6$ is _____
17. If the rule for a function f is $f(x) = 4^{x-6}$, then $f(8) =$ _____

Complete of the following statements of the elementary row operations for matrices.

18. _____ two rows
19. _____ a row by a non-zero constant and _____ that row with the product.
20. _____ a multiple of a row to another row and _____ one but not both of the rows with that sum.

21. Write the coefficient matrix of the following system of equations:
$$\begin{cases} -2x + 2y - 4z = 1 \\ 2x - 5y - z = 6 \\ 4x + 2y - 3z = 5 \end{cases}$$

22. Use the substitution method to solve the system
$$\begin{cases} -x + y = 2 \\ 4x - 3y = -3 \end{cases}$$

23. Supply the missing entries by performing the indicated elementary row operation.

$$\begin{bmatrix} 3 & -1 & 1 & 0 \\ 5 & -3 & 0 & 1 \end{bmatrix} \xrightarrow{\frac{1}{5}R_2 \rightarrow R_2} \begin{bmatrix} \square & \square & \square & \square \\ \square & \square & \square & \square \end{bmatrix}$$

23. Supply the missing entries by performing the indicated elementary row operation.

$$\begin{bmatrix} 2 & 1 & \frac{1}{5} & 0 \\ -4 & -3 & 0 & 1 \end{bmatrix} \xrightarrow{2R_1 + R_2 \rightarrow R_2} \begin{bmatrix} \square & \square & \square & \square \\ \square & \square & \square & \square \end{bmatrix}$$

24. Consider the matrices. $A = \begin{bmatrix} 1 & 2 & 2 \\ 3 & 7 & 9 \\ -1 & -4 & -7 \end{bmatrix}$ $X = \begin{bmatrix} x \\ y \\ z \end{bmatrix}$ $C = \begin{bmatrix} -1 \\ 2 \\ 1 \end{bmatrix}$ and $A^{-1} = \begin{bmatrix} -13 & 6 & 4 \\ 12 & -5 & -3 \\ -5 & 2 & 1 \end{bmatrix}$

Solve the matrix equation $AX = C$.

25. Compute the determinant of $\begin{bmatrix} 4 & 3 \\ 4 & 5 \end{bmatrix}$

26. Write the 3×3 identity matrix.

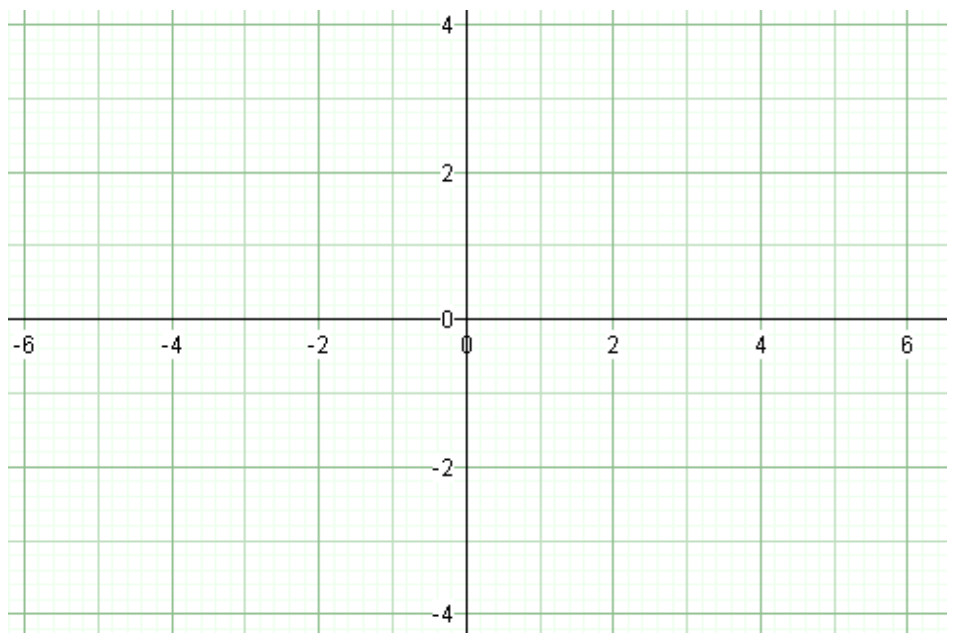
27. Perform the multiplication:

$$\begin{bmatrix} 1 & 2 & -4 \\ -2 & -3 & 3 \end{bmatrix} \begin{bmatrix} 2 & -2 \\ 3 & 1 \\ -1 & 2 \end{bmatrix} =$$

28. **(10 points)** Sketch the graph of the solution for the system

$$\begin{cases} 2x + 3y \leq 6 \\ -2x + 5y > -6 \\ -5x + 2y \leq 6 \end{cases}$$

Show and label the boundary lines, the important intercepts, points of intersection, and test points. Show all important computations.



29. (10 points) You do not need to do any computations. Simply fill in the blanks to describe the process for finding the inverse of a matrix.

To find the inverse of the matrix $A = \begin{bmatrix} 5 & 7 & 4 \\ 3 & -1 & 3 \\ 6 & 7 & 5 \end{bmatrix}$

Begin by adjoining the _____ matrix to obtain the matrix $\begin{bmatrix} 5 & 7 & 4 & 1 & 0 & 0 \\ 3 & -1 & 3 & 0 & 1 & 0 \\ 6 & 7 & 5 & 0 & 0 & 1 \end{bmatrix}$ with order _____

The next step is to get a _____ in the _____ position.

Then use that _____ to get _____ everywhere else in the _____

At this point the matrix will have been converted to $\begin{bmatrix} 1 & 7/5 & 4/5 & 1/5 & 0 & 0 \\ 0 & -26/5 & 3/5 & -3/5 & 1 & 0 \\ 0 & -7/5 & 1/5 & -6/5 & 0 & 1 \end{bmatrix}$

The next step is to get a _____ in the _____ position.

Then use that _____ to get _____ everywhere else in the _____

At this point the matrix will have been converted to $\begin{bmatrix} 1 & 0 & 25/26 & 1/26 & 7/26 & 0 \\ 0 & 1 & -3/26 & 3/26 & -5/26 & 0 \\ 0 & 0 & 1/26 & -27/26 & -7/26 & 1 \end{bmatrix}$

The next step is to get a _____ in the _____ position.

Then use that _____ to get _____ everywhere else in the _____

At this point the matrix will have been converted to $\begin{bmatrix} 1 & 0 & 0 & 26 & 7 & -25 \\ 0 & 1 & 0 & -3 & -1 & 3 \\ 0 & 0 & 1 & -27 & -7 & 26 \end{bmatrix}$

The inverse of A is matrix $A^{-1} =$

Which has order _____

30. Use the substitution method to solve the system
$$\begin{cases} x + 2y + z = 7 \\ -y + 3z = 9 \\ 2z = 6 \end{cases}$$

31. The inverse of $A = \begin{bmatrix} -2 & -3 & 1 \\ -3 & -3 & 1 \\ -2 & -4 & 1 \end{bmatrix}$ is the matrix $A^{-1} = \begin{bmatrix} 1 & -1 & 0 \\ 1 & 0 & -1 \\ 6 & -2 & -3 \end{bmatrix}$

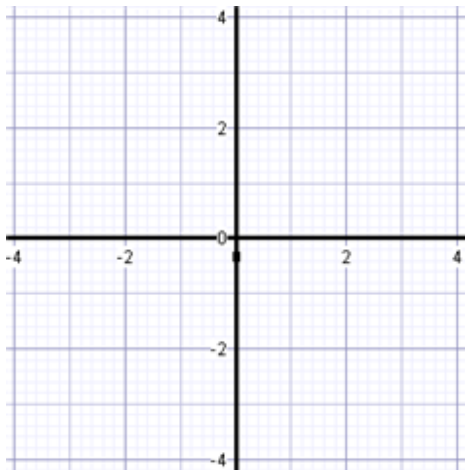
Use this information to solve the system
$$\begin{cases} -2x - 3y + z = 2 \\ -3x - 3y + z = 0 \\ -2x - 4y + z = 3 \end{cases}$$

32. Solve the equation $\log_2(x) + \log_2(x + 1) = 1$

33. Write $e^3 = y$ in logarithmic form.

34. Solve the equation $e^x x^2 - e^x x - 2e^x = 0$.

35. Sketch the graph of exp.



36. Sketch the graph of ln.

