

Show all your work for any credit.

Solve the problem. (4 pts)

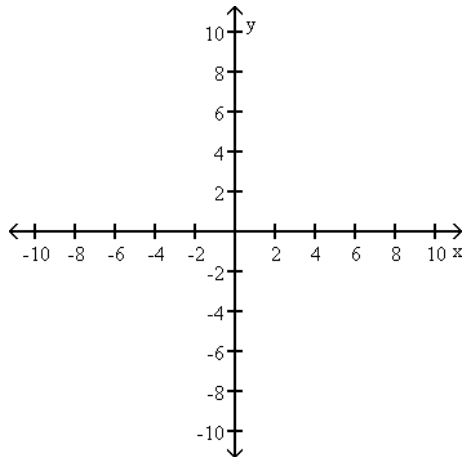
- 1) A hall 130 feet in length was designed as a whispering gallery (it is in the shape of an ellipse.) If the ceiling is 25 feet high at the center, how far from the center are the foci located?

1) _____

Find the center, axis, vertices, and foci of the equation, then sketch the graph. (8 pts)

2) $x^2 - 16y^2 + 6x + 128y - 263 = 0$

2) _____



Solve the system of equations using any matrix method. (8 pts)

3)
$$\begin{cases} x + y + z = 10 \\ x - y + 4z = 23 \\ 2x + y + z = 14 \end{cases}$$

3) _____

Solve for x. (6 pts)

$$4) \begin{vmatrix} 5 & -3 & 1 \\ -2 & -2 & x \\ 8 & 2 & -1 \end{vmatrix} = 28$$

4) _____

Show that the matrix has no inverse. (8 pts)

$$5) \begin{bmatrix} 2 & 10 & 4 \\ -3 & -1 & 1 \\ -1 & 7 & 4 \end{bmatrix}$$

5) _____

Solve the system using any matrix method. (5 pts)

$$6) \begin{cases} x + 2y + 3z = 7 \\ x + y + z = 10 \\ 2x + 2y + z = 2 \end{cases}$$

6) _____

The inverse of $\begin{bmatrix} 1 & 2 & 3 \\ 1 & 1 & 1 \\ 2 & 2 & 1 \end{bmatrix}$ is $\begin{bmatrix} -1 & 4 & -1 \\ 1 & -5 & 2 \\ 0 & 2 & -1 \end{bmatrix}$.

Write out the first five terms of the sequence. (4 pts)

7) $\{s_n\} = \{n^2 - n\}$

7) _____

Find the indicated term of the arithmetic sequence. (5 pts)

8) The 10th term of an arithmetic sequence with third term 2 and 6th term -2.5.

8) _____

Find the sum. (5 pts each)

9) $\sum_{n=1}^{25} (3n - 7)$

9) _____

Find the infinite sum if it exists. (6 pts)

10) $1 - \frac{1}{3} + \frac{1}{9} - \dots$

10) _____

Solve. (8 pts)

- 11) Kurt deposits \$150 each month into an account paying annual interest of 6% compounded monthly. How long will it take to accumulate \$27,948 in his account? 11) _____

Use the Principle of Mathematical Induction to show that the statement is true for all natural numbers n . (8 pts)

- 12) $4 + 9 + 14 + \dots + (5n - 1) = \frac{n}{2}(5n + 3)$ 12) _____