

1. (12 points) Solve the nonlinear system of equations below.

$$\begin{cases} x - y = -2 \\ x^2 + y^2 = 4 \end{cases}$$

2. (12 points) Find the partial fraction decomposition of $\frac{x - 25}{x^2 - 25}$.

3. (22 points) Perform the matrix operations indicated below. If the operation is not possible, write “undefined” and say why it is undefined.

(a) $3 \begin{bmatrix} 0 & -1 \\ 2 & 3 \end{bmatrix} - \begin{bmatrix} -1 & 2 \\ 5 & 0 \end{bmatrix}$

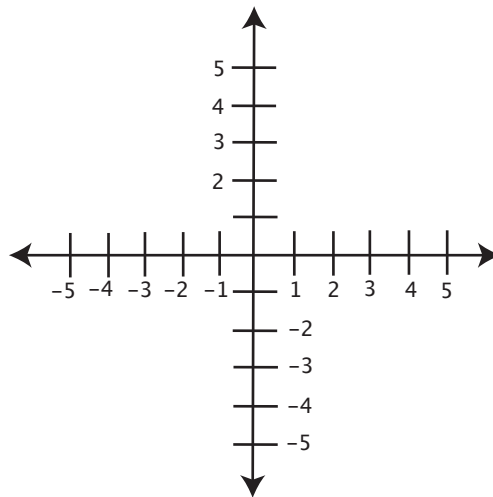
(b) $\begin{bmatrix} 0 & -1 & 2 \\ 2 & 3 & 4 \end{bmatrix} \begin{bmatrix} 1 & 2 \\ -1 & 0 \\ -3 & -1 \end{bmatrix}$

$$(c) \begin{bmatrix} 1 & 0 \\ -1 & 3 \end{bmatrix} \begin{bmatrix} 3 \\ -1 \\ 5 \end{bmatrix}$$

4. (4 points) What is the order of the matrix $\begin{bmatrix} 3 & -1 & \pi \\ 0 & \sqrt{2} & 9 \end{bmatrix}$?

5. (15 points) **(2804)** Sketch the solution to the system of inequalities below.

$$\begin{cases} x - 2y > 0 \\ x^2 + y^2 \leq 1 \end{cases}$$



6. (5 points) **(2804)** Write the augmented matrix corresponding to the system of equations below. **Do not solve the system! Just write the matrix!**

$$\begin{cases} 3x - 2y + z = 0 \\ 5x + 3y = -1 \\ 2x - y + 4z = 6 \end{cases}$$

7. **(2804)** Solve the system of equations below.

(a) (15 points)

$$\begin{cases} x + y + z = 7 \\ -x \quad \quad - 3z = 1 \\ 2x + 2y + 3z = 13 \end{cases}$$

(b) (15 points)

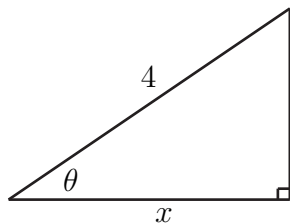
$$\begin{cases} x \quad \quad + 2z = 2 \\ \quad y - z = 1 \\ x - 2y + 4z = 0 \end{cases}$$

8. (5 points) **(1113)** Convert 220° to radians.

9. (10 points) **(1113)** Given that $\cos \theta = -\frac{3}{5}$ and $\sin \theta > 0$, find $\sin \theta$, $\tan \theta$, and $\sec \theta$.

10. (5 points) **(1113)** Evaluate $\arcsin\left(\sin\left(\frac{3\pi}{4}\right)\right)$.

11. (10 points) **(1113)** Solve for x in the right triangle below, given that $\theta = \frac{\pi}{6}$.



12. (10 points) **(1113)** Solve the equation $\sin x = \sqrt{3} - \sin x$. Be sure to give the general solution.

13. (10 points) **(1113)** Find the amplitude, period, and phase shift of $y = 3 \cos\left(2x - \frac{\pi}{2}\right)$.