

2212 Assignment

1. Find the angle between the vector $\mathbf{i} - 2\mathbf{j} + 3\mathbf{k}$ and $3\mathbf{i} - 2\mathbf{j} + \mathbf{k}$
2. If $\mathbf{a} = 5\mathbf{j} - \mathbf{j} - 3\mathbf{k}$ and $\mathbf{b} = \mathbf{i} + 3\mathbf{j} - 5\mathbf{k}$ then show that the vector $\mathbf{a} + \mathbf{b}$ and $\mathbf{a} - \mathbf{b}$ are perpendicular.
3. Find the value of x and y if they are equal matrices.

$$\begin{pmatrix} x-2 & 3 \\ -2 & 3y \end{pmatrix} = \begin{pmatrix} 1 & 3 \\ -2 & 15 \end{pmatrix}$$

4. The projection of a vector \mathbf{b} onto the line through \mathbf{a} is the closest point $p = a\left(\frac{\mathbf{a}^T \mathbf{b}}{\mathbf{a}^T \mathbf{a}}\right)$.

$$\mathbf{a} = \begin{bmatrix} 2 \\ 1 \end{bmatrix}, \mathbf{b} = \begin{bmatrix} 4 \\ 7 \end{bmatrix}$$

5. Find \mathbf{A}^{-1} by Gauss-Jordan elimination starting from $\mathbf{A} = \begin{bmatrix} 2 & 3 \\ 4 & 1 \end{bmatrix}$
6. Write the complete solution as x_p *plus* any multiple of s in the nullspace:

$$x + 3y + 3z = 1$$

$$2x + 6y + 9z = 5$$

$$-x - 3y + 3z = 5$$

7. For the system $x + y = 4$ and $x - y = 2$, Cramer's rule gives $x = ?$
8. Find eigenvalues for matrix \mathbf{A}

$$\mathbf{A} = \begin{bmatrix} 0 & 1 & 1 \\ 1 & 0 & 1 \\ 1 & 1 & 0 \end{bmatrix}$$

9. Find Eigenvectors

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

10. Factor these two matrices into $\mathbf{A} = \mathbf{X}\mathbf{\Lambda}\mathbf{X}^{-1}$

$$\mathbf{A} = \begin{bmatrix} 1 & 2 \\ 0 & 3 \end{bmatrix}$$