

Instructions: Clearly answer each of the questions below. Remember to check the back side. Show your work and any formulas you employ. Simplify all answers as far as possible.

1. (1 pt) If $F(\mathbf{x})$ is a function for which $F(c\mathbf{x} + d\mathbf{y}) = cF(\mathbf{x}) + dF(\mathbf{y})$ for any scalars c, d and vectors \mathbf{x} and \mathbf{y} , then F is a ...

Linear Transformation

2. (1 pt) What matrix would rotate plane vectors $3\pi/4$ clockwise?

$$\underline{\underline{\begin{bmatrix} -\frac{\sqrt{2}}{2} & \frac{\sqrt{2}}{2} \\ -\frac{\sqrt{2}}{2} & -\frac{\sqrt{2}}{2} \end{bmatrix}}}$$

3. (2 pts) Calculate $\begin{bmatrix} -8 & 6 \\ -1 & 9 \end{bmatrix} + \begin{bmatrix} 9 & 7 \\ 4 & -4 \end{bmatrix}$.

$$\underline{\underline{\begin{bmatrix} 1 & 13 \\ 3 & 5 \end{bmatrix}}}$$

4. (2 pts) Calculate $\begin{bmatrix} 5 & -1 \\ 2 & 1 \end{bmatrix} \begin{bmatrix} 4 & 3 \\ 4 & 1 \end{bmatrix}$.

$$\underline{\underline{\begin{bmatrix} 16 & 14 \\ 12 & 7 \end{bmatrix}}}$$

5. (2 pts) If $A = \begin{bmatrix} 4 & -3 & -2 \\ 1 & -4 & -3 \\ -2 & -5 & 2 \end{bmatrix}$, $B = \begin{bmatrix} 1 & -4 & -2 \\ -1 & -2 & -5 \\ 1 & 0 & -3 \end{bmatrix}$, and $C = AB$, what is $C_{2,3}$? _____ 27 _____