# QUIZ 7

NAME: _____

1. (3 points) Do the following calculation for

$$\mathbf{x} = \begin{bmatrix} 2 \\ -3 \end{bmatrix}, \quad \mathbf{y} = \begin{bmatrix} -1 \\ -5 \end{bmatrix}$$

(1) $\mathbf{x} \cdot \mathbf{y}$.
(2) $\frac{\mathbf{x} \cdot \mathbf{y}}{\mathbf{x} \cdot \mathbf{x}} \mathbf{x}$.
(3) the distance between $\mathbf{x}$ and $\mathbf{y}$.

2. (4 points) Find the $\mathcal{B}$-matrix for the transformation $x \to Ax$ when $\mathcal{B} = \{b_1, b_2\}$

$$A = \begin{bmatrix} -14 & 4 \\ -33 & 9 \end{bmatrix}, \quad b_1 = \begin{bmatrix} -1 \\ -2 \end{bmatrix}, \quad b_2 = \begin{bmatrix} 1 \\ 1 \end{bmatrix}.$$

3.(2 points) Define $T : \mathbb{P}_2 \to \mathbb{P}_2$ by $T(p) = p(2) + p(2)t + p(2)t^2$
(1) Find $T(p)$ when $p(t) = 1 + t + t^2$.
(2) Is $p(t) = 1 + t + t^2$ an eigenvector of $T$? If $p$ is an eigenvector, what is the eigenvalue?