

MATH 201: Linear Algebra – Quiz 4

NAME: _____

ID Number: _____

Problem 1. Let P_2 denote the set of polynomials of degree at most 2. Consider the function $T : P_2 \rightarrow P_2$ defined by

$$T(p(x)) = p(-x).$$

Is T an isomorphism? That is, is T an invertible, linear map?

Problem 2. Give two different bases $\mathcal{B}$ and $\mathcal{B}'$ for the linear space P_2 . Write a matrix A such that

$$A[\vec{x}]_{\mathcal{B}} = [\vec{x}]_{\mathcal{B}'}.$$

Problem 3. Let $\vec{u} = \begin{bmatrix} 1 \\ 0 \end{bmatrix}$ and $\vec{v} = \begin{bmatrix} 2 \\ 5 \end{bmatrix}$.

- (a) Compute the **orthogonal projection** of $\vec{v}$ onto the line spanned by $\vec{u}$.
- (b) Compute the component of $\vec{v}$ orthogonal to $\text{span } u$.