Quiz # 7 **Name:** _____
Date: 20/10/2022
Math 54: Fall 2022

Problem 1 - 5 Points

Consider the linear transformation $T : \mathbb{P}_2 \to \mathbb{P}_2$ given by $T\big(p(x)\big) = p(0) + p(1) \cdot x + p'(x) \cdot 2x$.

1. Using the standard basis $\mathcal{E} = \{1, x, x^2\}$, find the standard matrix of the transformation $[T]_{\mathcal{E}}$.
2. Find a basis $\mathcal{B}$ such that the matrix representation of the transformation under this basis $[T]_{\mathcal{B}}$ is diagonal. What is $[T]_{\mathcal{B}}$ under this basis?

Problem 2 - 5 Points

1. Show that $\|\mathbf{u}+\mathbf{v}\| \leq \|\mathbf{u}\| + \|\mathbf{v}\|$.
2. If $\|\mathbf{u}+\mathbf{v}\| = \|\mathbf{u}\| + \|\mathbf{v}\|$, what can you say about $\mathbf{u}, \mathbf{v}$? (Hint: This is called the triangle inequality. Why? Draw a picture to see what's going on!)