

Math 226 Assignment 3: Linear Operators

Answer all questions and show all working and check each of your results. Any rough work done before attempting your solutions should be attached to your answers as I need to know how you came up with them. You are allowed to talk with myself or other members of the class in general about the questions, but you must do them on your own.

1. Give this transformation T , explain why it is a linear operator and find the kernel and image of T , and their dimensions. [8]

$$T(x^2) := 4x^2 + 4x - 2, \quad T(x) := (1 - x), \quad T\left(\frac{1}{2}\right) := 6x^2 + 5x - 2$$

2. Find all other T -invariant subspaces, explaining why you have found them all. [12]
3. Show that \mathbb{P}_2 is T -reducible. [5]