

MATH 54 FALL 2017: DISCUSSION 205/208 QUIZ#7

GSI: CHRISTOPHER EUR, DATE: 10/13/2017

STUDENT NAME: _____

Problem 1. Consider the matrix

$$A = \begin{bmatrix} 1 & 1 & 0 \\ 0 & 1 & 2 \\ 0 & 0 & 1 \end{bmatrix}$$

- (a) (2 points) Determine whether A is invertible by computing $\det A$.
- (b) (3 points) For each eigenvalue of A , find a basis for its eigenspace.

Problem 2. (5 points) Let $\mathbb{P}_2 := \{a_0 + a_1t + a_2t^2 : a_0, a_1, a_2 \in \mathbb{R}\}$ be the vector space of polynomials of degree ≤ 2 . Consider the linear map

$$T : \mathbb{P}_2 \rightarrow \mathbb{P}_2 \text{ defined by } p(t) \mapsto p(t) + p'(t)$$

- (a) (3 points) Letting $B = \{1, t, t^2\}$ be a basis for \mathbb{P}_2 , write down the matrix of the linear transformation ${}_B[T]_B$.
- (b) (2 points) Find all polynomials $p(t) \in \mathbb{P}_2$ such that $T(p(t)) = p(t)$.