MATH 54 FALL 2016: DISCUSSION 102/105 QUIZ#6

GSI: CHRISTOPHER EUR, DATE: 10/5/2016

STUDENT NAME: ____________________________

Problem 1. Let H be a sub*set* of the vector space $\mathbb{R}^3$ defined as $H := \left\{ \begin{bmatrix} 3t+2s \\ -t \\ -t+s \end{bmatrix} \ : \ t, s \in \mathbb{R} \right\}$.

(a) (2 points) Express H as a column space of some matrix, and hence conclude that H is a subspace in $\mathbb{R}^3$.

(b) (2 points) Find a basis for H.

(c) (1 point) Express H as a nullspace of some matrix (Hint: the matrix will be 1×3.)

Problem 2. Let $\mathcal{P}_2 := \{a_2x^2 + a_1x + a_0 : a_2, a_1, a_0 \in \mathbb{R}\}$ be the vector space of polynomials of degree at most 2. For the following two statements, say whether it is true or false, and explain why.

(a) (2 points) If $(q_0(x), q_1(x), q_2(x))$ is a basis of P_2, then at least one among the three must be degree 1.

(b) (3 points) Suppose we have $p_0(x), p_1(x), p_2(x) \in \mathcal{P}_2$ such that $p_j(2) = 0$ for all $j = 0, 1, 2$. Then $\text{span}\{p_0(x), p_1(x), p_2(x)\} \neq \mathcal{P}_2$.