First Midterm, Math 54, 2010022416-17.

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Your name: _____

Student ID #: _____

GSI & meeting time: _____

Correct answer without explanation = no credit

① Find all values of a such that $\begin{bmatrix} a & 1 & & \\ 1 & 2 & 1 & \\ & 1 & 2 & 1 \\ & & 1 & a \end{bmatrix}$ is singular.

(2) Let $A = \begin{bmatrix} 1 & 0 & 1 & 2 \\ 1 & 0 & 2 & 3 \\ 2 & 0 & 3 & 5 \end{bmatrix}$.

(a) Find a basis for Nul(A)

(b) Find a basis for Col(A).

(c) Let $T\underline{x} = A\underline{x}$ map $\mathbb{R}^4$ into $\mathbb{R}^3$. Is T onto?

③ Let $H = \{ p(t) \in \mathcal{P}_2 : (\frac{d}{dt} p)(1) = 0 \}$

(a) Show that H is a subspace of $\mathcal{P}_2$.

(b) Find a basis for H.