Smith **Math 290** **Fall 2010**

Proof SLE-2

Accepted **Not Accepted**

I affirm this work abides by the university's Academic Honesty Policy.

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Print Name, then Sign

- First due date **Thursday, February** 11.
- Turn in your work on a separate sheet of paper with this page stapled in front.
- Do not include scratch work in your submission.
- There is to be **no collaboration** on any aspect of developing and presenting your proof. Your only resources are: you, the course textbook, me, and pertinent discussions that occur **during class.**
- Follow the Writing Guidelines of the Grading Rubric in the course information sheet.
- Retry: Only use material from the relevant section of the text or earlier.
- Retry: Start over using a new sheet of paper.
- Retry: Restaple with new attempts first and this page on top.

"*It is by logic that we prove but by intuition that we discover.*" (Henri Poincaré)

SLE-2 (Section VO) Let A be an $m \times n$ matrix and $LS\left(A, \vec{0}\right)$ be the corresponding homogeneous linear system of equations. Let $\vec{b}$ be a constant vector for which the linear system $LS\left(A, \vec{b}\right)$ is consistent. Denote the solution set of $LS\left(A, \vec{b}\right)$ by S and, since $LS\left(A, \vec{b}\right)$ is consistent, we know there is a specific vector $\vec{\boldsymbol{\beta}} = \begin{bmatrix} \beta_1 \\ \beta_2 \\ \vdots \\ \beta_n \end{bmatrix} \in S$. Let $T = \left\{ \begin{bmatrix} y_1 + \beta_1 \\ y_2 + \beta_2 \\ \vdots \\ y_n + \beta_n \end{bmatrix} \in \mathbf{C}^n : \begin{bmatrix} y_1 \\ y_2 \\ \vdots \\ y_n \end{bmatrix} \in N(A) \right\}$.

1. Prove $S = T$.

Use the specific notation: $[A]_{ij} = \alpha_{ij}$, $1 \le i \le m$, $1 \le j \le n$ and recall that $N\left(A\right)$ is the null space of A.
