Smith **Math 290** **Fall 2008**

Proof M-1

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, October** 23.
- Turn in the the final version of your work on a separate sheet of paper with this page stapled in front.
- Do not include scratch work in your submission.
- Follow the Writing Guidelines of the Grading Rubric.
  (http://math.ups.edu/~bryans/Current/Fall_2008/290inf_Fall2008.html#tth_sEc5.1)
- Retry: Only use material from the relevant section or earlier.
- Retry: Start over using a new sheet of paper.
- Retry: Restaple with new attempts first and this page on top.

"*Often you must turn your stylus to erase, if you hope to write anything worth a second reading*". -Horace, poet and satirist (65-8 BCE)

M-1 (Section MISLE)

1. Given an $m \times n$ matrix A and an $n \times m$ matrix B where $m > n$, prove that it is impossible to have the product $AB = I_m$.
2. Show that the order of multiplication is important by finding a specific 6×4 matrix A and a specific 4×6 matrix B where $BA = I_4$.
3. For bonus points, generalize your answer in part 2. That is, prove that for any positive integers m and n with $m > n$, then there is an $m \times n$ matrix A and an $n \times m$ matrix B with $BA = I_n$.

Notes:

- These matrices are not square so don't use results that require square matrices.
- One way to approach part 1 is to think about null spaces.
- For parts 2 and 3, consider $[2 \quad 0] \begin{bmatrix} \frac{1}{2} \\ 0 \end{bmatrix} = [1] = I_1$
