

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, March 4**.
- 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.

*"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)*

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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  $6 \times 4$  matrix  $A$  and a specific  $4 \times 6$  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  $[2 \ 0] \begin{bmatrix} \frac{1}{2} \\ 0 \end{bmatrix} = [1] = I_1$