Not Turned In

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                                                                    Name

Be sure to re-read the WRITING GUIDELINES rubric, since it defines how your project will be graded. In particular, you may discuss this project with others but **you may not collaborate on the written exposition of the solution.**

"_Do not imagine that Mathematics is hard and crabbed, and repulsive to common sense. It is merely the etherealization of common sense._" – Lord Kelvin

Project Problem

Do **both** of the following.

1. If A is $m \times n$ and B is $n \times m$ (note that neither A nor B is square and hence neither has a determinant), show that the determinant of the partitioned matrix, C, below satisfies $\det(C) = \det(AB)$.

$$C = \left[\begin{array}{cc} O & A \\ -B & I \end{array} \right]$$

[Hint: Consider multiplying by $\left[\begin{array}{cc} I & O \\ B & I \end{array} \right]$.]

Do an example with $m < n$ and an example with $m > n$. Do you understand why the second example has $\det(AB) = 0$?

2. Explain why the following 5×5 matrix that has a 3×3 zero submatrix is definitely singular (regardless of the 16 non-zeros marked by x's.)

$$\left[\begin{array}{ccccc} x & x & x & x & x \\ x & x & x & x & x \\ 0 & 0 & 0 & x & x \\ 0 & 0 & 0 & x & x \\ 0 & 0 & 0 & x & x \end{array} \right]$$