Date _____

MTH 261
Linear Algebra
Summer 2017

The Invertible Matrix Theorem

Find partners, and follow the instructions. You will not turn this in, but you must be working diligently to get attendance credit.

1. Use the Invertible Matrix Theorem to explain why: if A is invertible, then the columns of A^T are linearly independent. (This takes two steps of explanation.)

2. Can a square matrix with two parallel *rows* be invertible? Cite specifics in the Invertible Matrix Theorem that back up your answer.

3. Suppose that two $n \times n$ matrices E and F are such that $EF = I$. Citing the Invertible Matrix Theorem when appropriate, can we conclude that $EF = FE$? Answer using logic and *only* the items from the Invertible Matrix Theorem.

4. Let A and B be $n \times n$ matrices. If AB is an invertible matrix, is B necessarily invertible? Cite the Invertible Matrix Theorem appropriately.

5. Suppose that $\{\vec{v}_1, \vec{v}_2, \ldots, \vec{v}_n\}$ are linearly independent vectors in $\mathbb{R}^n$. Let

$$A = \begin{bmatrix} \text{---} & \vec{v}_1^T & \text{---} \\ \text{---} & \vec{v}_2^T & \text{---} \\ & \vdots & \\ \text{---} & \vec{v}_n^T & \text{---} \end{bmatrix}$$

Is A necessarily invertible? Why or why not?

6. Without looking, try to write down as many of the parts of the Invertible Matrix Theorem as you can recall. At this point, there are 12 parts.