MAT 167 Homework 1

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True or false? Give a specic counterexample when false.

1. If columns 1 and 3 of B are the same, so are columns 1 and 3 of AB.

   True

2. If rows 1 and 3 of B are the same, so are rows 1 and 3 of AB.

   False

$$A = \begin{pmatrix} 1 & 1 & 1 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{pmatrix}, B = \begin{pmatrix} 1 & 1 & 1 \\ 0 & 0 & 0 \\ 1 & 1 & 1 \end{pmatrix}, AB = \begin{pmatrix} 2 & 2 & 2 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{pmatrix}$$

3. If rows 1 and 3 of A are the same, so are rows 1 and 3 of AB.

   True

4. $(AB)^2 = A^2B^2$

   False

$$A = \begin{pmatrix} 1 & 1 & 1 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{pmatrix}, B = \begin{pmatrix} 1 & 1 & 1 \\ 0 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}, (AB)^2 = \begin{pmatrix} 1 & 1 & 2 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{pmatrix} A^2B^2 = \begin{pmatrix} 1 & 1 & 3 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{pmatrix},$$

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