

MATH430

HA 4, due Wednesday, October 7, 2009

To get credit you should provide either a full proof, or a counterexample.

1. If B is obtained from A by a single elementary row operation, then there is an invertible matrix E such that $EA = B$ (the matrix E is called an elementary matrix). Provide E for each one of the three elementary row operations.
2. If A and B are non-singular, and $AB = BA$, then $AB^{-1} = B^{-1}A$.
3. Let A and B be $n \times m$ matrices. True or False? If there are $m \times m$ matrices P and Q such that $AP = B$ and $A = BQ$, then P and Q are non-singular.
4. If E is an elementary matrix, then $\text{rank}(EA) = \text{rank} A$. If B, C are invertible, then $\text{rank}(BA) = \text{rank}(AC) = \text{rank} A$.