## Math 2B: Applied Linear Algebra

True/False For the problems below, circle T if the answer is true and circle F is the answer is false.

1.	Т	F	For square matrices $A, B$ , if $AB = I$ , then A is invertible.
2.	Т	F	For matrices $A, B$ with proper dimensions, If $AB = I_n$ , then A is invertible.
3.	Т	F	Every square matrix is a product of elementary matrices.
4.	Т	F	Every invertible matrix is a product of elementary matrices.
5.	Т	F	If A is a $3 \times 3$ matrix with three pivot positions, then for some $t \in \mathbb{N}$ there exist elementary matrices $E_1, E_2,, E_t \in \mathbb{R}^3$ such that $E_t \cdots E_2 \cdot E_1 \cdot A = I_3$ .
6.	Т	F	Any square matrix with nonzero diagonal entries must be invertible.

## Free Response

1. Show that the matrix  $A \in \mathbb{R}^{5 \times 5}$  given by

$$A = \begin{bmatrix} 0 & a & 0 & 0 & 0 \\ b & 0 & c & 0 & 0 \\ 0 & d & 0 & e & 0 \\ 0 & 0 & f & 0 & g \\ 0 & 0 & 0 & h & 0 \end{bmatrix}$$

in not invertible for any nonzero values  $a, b, c, d, e, f, g, h \in \mathbb{R}$ . Explain your solution.