Name : $\qquad$
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## 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. T F For square matrices $A, B$, if $A B=I$, then $A$ is invertible.
2. T F For matrices $A, B$ with proper dimensions, If $A B=I_{n}$, then $A$ is invertible.
3. T F Every square matrix is a product of elementary matrices.
4. T F Every invertible matrix is a product of elementary matrices.
5. T F If $A$ is a $3 \times 3$ matrix with three pivot positions, then for some $t \in \mathbb{N}$ there exist elementary matrices $E_{1}, E_{2}, \ldots, E_{t} \in \mathbb{R}^{3}$ such that $E_{t} \cdots E_{2} \cdot E_{1} \cdot A=I_{3}$.
6. T 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

$$
A=\left[\begin{array}{lllll}
0 & a & 0 & 0 & 0 \\
b & 0 & c & 0 & 0 \\
0 & d & 0 & e & 0 \\
0 & 0 & f & 0 & g \\
0 & 0 & 0 & h & 0
\end{array}\right]
$$

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

