Chapter 2: Bonus Problems

Determine if the following statements are true or false. Please justify your answers if you believe that the giving statements are false.

1. The product of square matrices is always defined.
2. The transpose of an invertible matrix is invertible.
3. It is possible for an invertible matrix to have two distinct inverses.
4. The sum of an invertible matrix and its inverse is the zero matrix.
5. The columns of an invertible matrix are linearly independent.
6. If a matrix is invertible, then its rank equals the number of its rows.
7. If A is an $n \times n$ matrix and the system $A\vec{x} = \vec{b}$ is consistent for some $\vec{b}$, then A is invertible.
8. The range of a linear transformation is contained in the co-domain of the linear transformation.
9. The null space of a linear transformation is contained in the co-domain of the linear transformation.
10. Linear transformations preserve linear combinations.
11. Linear transformations preserve linearly independent sets.
12. Every linear transformation has a standard matrix.
13. The zero transformation is the only linear transformation whose standard matrix is the zero matrix.
14. If a linear transformation is onto, then its range equals its co-domain.
15. If a linear transformation is onto, then the rows of its standard matrix span its columns.