Math 120 Discussion Worksheet #1

Name:_____ Student ID:_____

Answer each question. For True/False statements, circle **T** or **F**.

Linear algebra review:

Let A be an $m \times n$ matrix, and let $\vec{b}$ be a vector in $\mathbb{R}^m$.
For $\vec{u}, \vec{v} \in \mathbb{R}^n$, the notation $\vec{u} \leq \vec{v}$ means $u_1 \leq v_1, u_2 \leq v_2, \ldots, u_n \leq v_n$.

1. The equation $A\vec{x} = \vec{b}$ has a solution if and only if $\vec{b}$ is a linear combination of the columns of A. **T** / **F**
2. $V = \{\vec{x} \mid A\vec{x} = \vec{b}\}$ is infinite if and only if $\dim(Nul(A)) > 0$. **T** / **F**
3. If $m < n$, then $V = \{\vec{x} \mid A\vec{x} = \vec{b}\}$ is infinite. **T** / **F**
4. $\{\vec{x} \mid A\vec{x} \leq \vec{b}\}$ is a subspace of $\mathbb{R}^n$. **T** / **F**
5. $\{\vec{x} \mid A\vec{x} \leq \vec{0}\}$ is a subspace of $\mathbb{R}^n$. **T** / **F**
6. $\{\vec{x} \mid A\vec{x} = \vec{b}\}$ is a subspace of $\mathbb{R}^n$. **T** / **F**
7. $\{\vec{x} \mid A\vec{x} = \vec{0}\}$ is a subspace of $\mathbb{R}^n$. **T** / **F**
8. Homogeneous equations $A\vec{x} = \vec{0}$ always have a solution. **T** / **F**
9. If $\vec{p}$ is a solution to $A\vec{x} = \vec{b}$, then $\vec{p} + \vec{v}$ is also solution to $A\vec{x} = \vec{b}$ for any solution $\vec{v}$ to $A\vec{x} = \vec{0}$. **T** / **F**
10. Row operations on the augmented matrix $[A\ \vec{b}]$ are equivalent to multiplying on both sides of $A\vec{x} = \vec{b}$ by an *elementary matrix.* **T** / **F**
11. Suppose A is invertible. We can use row operations to transform the augmented matrix $[A\ \vec{b}]$ into the matrix $[I_n\ \vec{p}]$ for some $\vec{p}$ in $\mathbb{R}^n$. **T** / **F**
12. Suppose $m < n$ and the first m columns of A are linearly independent. We can use row operations to transform the augmented matrix $[A\ \vec{b}]$ into the matrix $[I_m\ D\ \vec{p}]$ for some $m \times (n-m)$ matrix D and some $\vec{p}$ in $\mathbb{R}^n$. **T** / **F**
13. $\vec{x} = \begin{bmatrix} \vec{p} \\ \vec{0} \end{bmatrix}$ is a solution to $A\vec{x} = \vec{b}$ in the previous problem. **T** / **F**
14. Consider linear equation $A\vec{x} = \vec{b}$. If the *rows* of A are rearranged, then the order of the variables in $\vec{x}$ must be rearranged. **T** / **F**
15. Consider linear equation $A\vec{x} = \vec{b}$. If the *columns* of A are rearranged, then the order of the variables in $\vec{x}$ must be rearranged. **T** / **F**