THEOREM 2 EXISTENCE AND UNIQUENESS THEOREM

1. *A linear system is consistent if and only if the rightmost column of the augmented matrix is* ***not*** *a pivot column, that is, if and only if an echelon form of the augmented matrix has no row of the form* $\begin{bmatrix} \mathbf{0} & \cdots & \mathbf{0} & \mathbf{b} \end{bmatrix}$, *with* $\mathbf{b} \neq \mathbf{0}$.
2. *If a linear system is consistent, then the solution set contains either*
   - *(i) a unique solution, when there are no free variables, or*
   - *(ii) infinitely many solutions, when there is at least one free variable.*