Math 1553, Quiz 5 (3.2 and 3.3), Fall 2026, Version A

Name (ALL CAPS)		**GT ID**		**Section**	

Please write your name in ALL CAPS. For questions with bubbles, either fill in the bubble completely or leave it blank. **Do not** mark any bubble with "X" or "/" or any such intermediate marking. Anything other than a blank or filled bubble will be given a score of zero.

1. (1 point) If $T : \mathbf{R}^2 \to \mathbf{R}^2$ is a linear transformation and $T\begin{pmatrix}0\\1\end{pmatrix} = \begin{pmatrix}0\\0\end{pmatrix}$, then the linear transformation T is not one-to-one.

   ◯ TRUE ◯ FALSE

2. (1 point) Let $T : \mathbf{R}^2 \to \mathbf{R}^2$ be the linear transformation that rotates vectors by 90° counter-clockwise. Find the vector v so that $T(v) = \begin{pmatrix}4\\3\end{pmatrix}$. Fill in the bubble for the correct answer below.

   ◯ $\begin{pmatrix}-3\\4\end{pmatrix}$ ◯ $\begin{pmatrix}3\\-4\end{pmatrix}$ ◯ $\begin{pmatrix}4\\3\end{pmatrix}$ ◯ $\begin{pmatrix}-4\\-3\end{pmatrix}$ ◯ $\begin{pmatrix}3\\4\end{pmatrix}$

3. (1 point) Suppose that $T : \mathbf{R}^n \to \mathbf{R}^m$ is a linear transformation with standard matrix A. Which of the following conditions guarantees that T is onto? Fill in the bubble for all that apply.

   ◯ For each y in $\mathbf{R}^m$, there is at least one x in $\mathbf{R}^n$ so that $T(x) = y$.

   ◯ The matrix equation $Ax = 0$ has only the trivial solution.