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

Name (ALL CAPS)	Key	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 $T : \mathbf{R^2} \to \mathbf{R^3}$ is a linear transformation and A is the standard matrix of T, then for some vector b in $\mathbf{R^3}$ the system $Ax = b$ is inconsistent.

● TRUE ○ FALSE

2. (1 point) Suppose a linear transformation T satisfies $T\begin{pmatrix}2\\-1\end{pmatrix} = \begin{pmatrix}3\\2\end{pmatrix}$ and $T\begin{pmatrix}1\\2\end{pmatrix} = \begin{pmatrix}-1\\5\end{pmatrix}$.

Compute $T(v)$ for the vector $v = 2\begin{pmatrix}2\\-1\end{pmatrix} - 3\begin{pmatrix}1\\2\end{pmatrix}$. Fill in the bubble for the correct answer below.

○ $\begin{pmatrix}2\\-3\end{pmatrix}$ ○ $\begin{pmatrix}4&-2\\-3&-6\end{pmatrix}$ ● $\begin{pmatrix}9\\-11\end{pmatrix}$ ○ $\begin{pmatrix}1\\-8\end{pmatrix}$ ○ none of these

$T(2x-3y) = 2T(x) - 3T(y) = 2\begin{bmatrix}3\\2\end{bmatrix} - 3\begin{bmatrix}-1\\5\end{bmatrix} = \begin{bmatrix}6+3\\4-15\end{bmatrix} = \begin{bmatrix}9\\-11\end{bmatrix}$

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 one-to-one? Fill in the bubble for all that apply.

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

● The range of T is a n-dimensional subspace of $\mathbf{R}^m$. ✓

$A = \begin{bmatrix} v_1 & v_2 & \cdots & v_n \end{bmatrix}$

$T(x) = Ax$ is 1-to-1 if A has n pivots

So $\operatorname{Col} A$ = "range of T" is n-dim'l ✓