11. Mark each as true or false. If the statement is false, correct the statement so that it is true. (16 points)

a. The columns of an $3 \times 8$ matrix are linearly independent.

more vectors than entries $\Rightarrow L.D.$
False

b. Asking whether linear system corresponding to the augmented matrix $[a_1, \ a_2, \ a_3, \ b]$ has a solution amounts to asking whether $b$ is in $\text{Span} \{ a_1, \ a_2, \ a_3 \}$.

True

c. If $A$ is a $5 \times 3$ matrix and $T$ is a linear transformation defined by $T(x) = Ax$, then the domain of $T$ is $\mathbb{R}^5$.

$\mathbb{R}^5 \rightarrow \mathbb{R}^5$ False the domain is $\mathbb{R}^3$
and the codomain is $\mathbb{R}^5$.

False

d. The set $\text{Span}\{u, \ v\}$ is always visualized as a plane through the origin for any vectors $u$ and $v$, where vectors $u$ and $v$ are in $\mathbb{R}^3$. and $\bar{u}$ and $\bar{v}$ are not scalar multiples of each other.

False

e. If $A$ is a $4 \times 4$ matrix, then the transformation $x \mapsto Ax$ maps $\mathbb{R}^4$ onto $\mathbb{R}^4$.

False. if there are four pivots, one in each row.

f. If $x$ and $y$ are linearly independent, and if $\{x, \ y, \ z\}$ is linearly dependent, then $z$ is in $\text{Span}\{x, \ y\}$.

True

g. Every linear transformation is a matrix transformation.

False. Derivatives are LT.
Every matrix transformation is a linear transformation.

h. A linear transformation $T: \mathbb{R}^n \rightarrow \mathbb{R}^m$ always maps the origin of $\mathbb{R}^n$ to the origin of $\mathbb{R}^m$.

True.