UNGRADED ASSESSMENT 1, 9/23 YOUR NAME OPTIONAL

(1) Your professor's name is _____.

(2) What are the three properties that define a linear transformation?
   (a)
   (b)
   (c)

(3) A linear transformation $T : \mathbb{R}^n \to \mathbb{R}^m$ has standard matrix A. In this question's parts, there may be more than one right answer; you only have to give one.

   (a) How big is A? (That is, what are its dimensions?)

   (b) Name a property of A that is equivalent to T being one-to-one.

   (c) Name a property of A that is equivalent to T being onto.

   (d) Complete the sentence: T is invertible if and only if A is ...

(4) A linear transformation $T : \mathbb{R}^n \to \mathbb{R}^m$ has standard matrix $A = \begin{bmatrix} 3 & 0 & 1 \\ 1 & 0 & -1 \end{bmatrix}$.

   (a) What are m and n for this T?

   (b) What is the domain of T?

   (c) What is the codomain of T?

   (d) Is T invertible? Explain.

   (e) $\text{rank}(A) =$ _____

   (f) Find a basis for the column space, $\text{Col}(A)$.

   (g) Find a basis for the null space, $\text{Nul}(A)$.

   (h) What is the range of T?