Math 320 Linear Algebra
Assignment # 10

1. Suppose the X and Y are sets (don't assume they are sets of vectors they are just sets). Let $f : X \to Y$ and $g : Y \to Z$. Prove that $g \circ f : X \to Z$ is onto then g is onto.

2. Suppose $A \in \mathbb{R}^{m \times n}$. Show $\text{Col}(A)$ is a subpace of $\mathbb{R}^m$.

   Remember that $\text{Col}(A) = \{\vec{b} \in \mathbb{R}^m : \exists \vec{u} \in \mathbb{R}^n, \text{ such that } A\vec{u} = \vec{b}\}$.

   I made a short video that might help with this problem: Null space and column space video

3. Suppose $A \in \mathbb{R}^{m \times n}$ and $\vec{b} \in \mathbb{R}^m$ with $\vec{b} \neq \vec{0}$. Let $H = \{\vec{u} \in \mathbb{R}^n : A\vec{u} = \vec{b}\}$. Either prove H is a subspace of $\mathbb{R}^n$ or explain why it isn't.