Math 320 Linear Algebra
Assignment # 6

1. Suppose that $B, C \in \mathbb{R}^{p \times m}$ and $A \in \mathbb{R}^{m \times n}$. Prove that:

$$(B + C)A = BA + CA$$

   If you want to see an example of a proof like this, I recored one at:

   Matrix Multiplication Proof Video

2. (a) Suppose X, Y and Z are sets (not necessarily of vectors) and $f : X \to Y$ and $g : Y \to Z$. Show that if $g \circ f : X \to Z$ is 1-1 (injection) then f is 1-1. (Hint: Suppose $f(x_1) = f(x_2)$ for some $x_1, x_2 \in X$ then prove $x_1 = x_2$.)

   (b) Clearly write the contrapositive of this statement.

   (c) Suppose $A \in \mathbb{R}^{m \times n}$, and $B \in \mathbb{R}^{n \times p}$. Show if the columns of B are linearly dependent then so are the columns of AB.

   If you are new to proving things are 1-1, this video should really help:

   Proving Functions are 1-1