

## Math 320 Linear Algebra Assignment # 8

1. Suppose  $X, Y$  and  $Z$  are sets (not necessarily of vectors) and  $f : X \rightarrow Y$  and  $g : Y \rightarrow Z$ . Show that if both  $f$  and  $g$  are 1-1 (injections) then  $g \circ f : X \rightarrow Z$  is 1-1.
2. Suppose  $A, B, C \in \mathbb{R}^{m \times n}$ . Prove that:

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

3. 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](#)

4. 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  $AB$ .