

Math 320 Linear Algebra

Assignment # 6 Due: Tuesday, October 20

Textbook Problems:

2.1: 15, 27, 28

2.2: 1, 2, 4, 8, 9, 10, 14, 32

Additional Problems:

Note: I don't know if these video links will work for you (they work for me but I am the owner of the videos). But they are on Canvas.

1. Suppose the X, Y and Z are sets (don't assume they are sets of vectors they are just sets). Let $f : X \rightarrow Y$ and $g : Y \rightarrow Z$. Prove that $g \circ f : X \rightarrow Z$ is onto then g is onto. If you are new to proving things are onto, this video should help:

[Proving Functions are Onto](#)

2. 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](#)

3. (a) Suppose X, Y and Z are sets (not necessarily of vectors) and $f : X \rightarrow Y$ and $g : Y \rightarrow Z$. Show that if $g \circ f : X \rightarrow Z$ 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](#)