Turn these problems in with the assigned problems from the text:

(1) Let $S : U \to V$ and $T : V \to W$ be linear transformations. Show that the composite map

$$TS : U \to W$$

defined by

$$(TS)(\vec{u}) = T(S(\vec{u}))$$

is a linear transformation.

(Optional) Bonus Problems: For each problem that you solve correctly I will increase your homework score by one point. All or nothing for these – no partial credit.

(1) Recall that a function $f : A \to B$ is called *one-to-one* if distinct elements of A are mapped to distinct elements of B. Said differently, a function f is one-to-one if $f(x_1) = f(x_2)$ implies that $x_1 = x_2$.

Show that a linear transformation $T : V \to W$ is one-to-one if and only if $\ker(T) = \{\vec{0}\}$.