A few basic points

1. Here are a few simple facts about inverting square matrices. Let A and B be $n \times n$ matrices. Officially, the definition of inverse requires $AB = I$ <u>and</u> $BA = I$. In the context of matrices, it can be shown that either one implies the other.

a) The product AB is invertible if and only if A and B are both invertible.

b) Because AB and BA are usually unequal, the correct formula for the inverse of AB is: $(AB)^{-1} = B^{-1}A^{-1}$ (note the change of order). Thank goodness matrix multiplication is associative!

c) There is no nifty formula for $(A+B)^{-1}$. There isn't even one for 1×1 matrices, as we recall from Calc 0.

d) You should be aware that matrix multiplication is defined the way it is to reflect composition:

$$T_A \circ T_B = T_{AB}.$$

2. Consider the projection of $\mathbb{R}^2$ onto a line $L \subset \mathbb{R}^2$ passing through the origin. One could take as codomain either $\mathbb{R}^2$ or L. Here, and situations like this in our course, the codomain will be $\mathbb{R}^2$ unless stated otherwise.

3. If the equation $A\vec{x} = \vec{b}$ is consistent, the appearance of the solution set for this equation is very *similar* to that of the equation $A\vec{x} = \vec{0}$ (the preceding with $\vec{b} = \vec{0}$), which is always consistent. What's the *difference*?