1. Prove that any two non-zero vectors in $\mathbb{R}^2$ which are not collinear span $\mathbb{R}^2$.
   *Hint:* The hard part here is figuring out how to express and then use the fact that the vectors are not collinear.

2. Let $F = \{a + b\sqrt{5} : a, b \in \mathbb{Q}\}$. Show that $F$ is a field.
   *Hint:* Since $F \subseteq \mathbb{R}$, you can take things like associativity, commutativity, and the distributive law as known. What you need to check is that $0, 1 \in F$, that the sum and product of two numbers in $F$ is actually in $F$, and that the additive and multiplicative inverses of a number in $F$ are in $F$.

3. (a) Prove part 3 of Theorem 1.5.
   (b) Prove part 8 of Theorem 1.5.