Problem 1. Suppose $f: \mathbb{R}P^2 \to \mathbb{R}P^2$ is not surjective. Then
   (a) the induced map $f_* : \pi_1(\mathbb{R}P^2) \to \pi_1(\mathbb{R}P^2)$ is trivial (Hint: what is $\mathbb{R}P^2 - \{\text{point}\}$?);
   (b) $f$ is homotopic to a constant map. (You may use the conclusion of (a), whether you prove it or not.)

Problem 2. In this problem, all surfaces are closed, connected and orientable.
   (a) Suppose $S$ is a surface of genus 2. Show that for every $g > 1$, the surface of genus $g$ occurs as a covering space of $S$.
   (b) Now suppose $S$ has genus 3. For which values of $g$ does the surface of genus $g$ occur as a covering space of $S$?

Problem 3. Compute $\pi_1(X)$, where $X$ is obtained from two tori $S^1 \times S^1$, by identifying $\{\text{point}\} \times S^1$ in the first torus with the diagonal of the second torus.