1. Complete these problems from the book:
   (a) p.103, Exercise 3.1.9
   (b) p.108, Exercise 3.2.1
   (c) p.109, Exercise 3.2.3, Exercise 3.2.4, Exercise 3.2.5, Exercise 3.2.9, Exercise 3.2.11
2. Show that any continuous map $f : \mathbb{R} \to \mathbb{Z}$ is constant.
3. Recall the notion of open sets $A \subset \mathbb{R}$.

$$A \subset \mathbb{R} \text{ is open} :\Leftrightarrow \forall x_0 \in A : \ \exists \varepsilon > 0 : \ (x_0 - \varepsilon, x_0 + \varepsilon) \subset A.$$

   Show the following. Let $f : \mathbb{R} \to \mathbb{R}$ be a function. Then the following are equivalent
   (a) $f : \mathbb{R} \to \mathbb{R}$ is continuous.
   (b) the inverse f^{-1} maps open sets into open sets. That is: whenever $A \subset \mathbb{R}$ is an open set, then the $f^{-1}(A)$ defined as

$$f^{-1}(A) \equiv \{x \in \mathbb{R} : f(x) \in A\}$$

   is an open set.