Worksheet §12.2

1. Making sure to justify your answers, for each of the following, come up with a function $f : \mathbb{R} \to \mathbb{R}$ which is ...

   (a) injective but not surjective

   (b) surjective but not injective

   (c) bijective

   (d) neither injective nor surjective

2. Consider

$$\begin{aligned} h : \mathbb{N} &\to \mathbb{N} \\ x &\mapsto x^2 + x - 1. \end{aligned}$$

   Is h injective and/or surjective?

3. Let $A = \{1, 2, 3, 4, 5\}$ and $B = \{1, 2, 3\}$. Consider

$$\begin{aligned} f : \mathscr{P}(A) &\to \mathscr{P}(B) \\ X &\mapsto X \cap B. \end{aligned}$$

   Is f injective and/or surjective?

4. Let $A = \{1, 2, 3, 4, 5\}$. Consider

$$\begin{aligned} g : A &\to \mathscr{P}(A) \\ n &\mapsto \{1, 2, \ldots, n\}. \end{aligned}$$

   Is g injective and/or surjective?