1. Consider the function $f : \mathbb{R} \times \mathbb{N} \to \mathbb{Z}$ given by $f(x,y) := \left\lfloor \frac{x}{y+1} \right\rfloor$.

   (a) Is f a one-to-one function?

   (b) Is f an onto function?

2. Let $f : \mathbb{N} \to \mathbb{N}$ be a one-to-one function.

   Consider the function $g : \mathbb{N} \times \mathbb{N} \to \mathbb{Z} \times \mathbb{Z}$ given by $g(x,y) := (f(x) - y, f(x) + y)$.

   (a) Is g a one-to-one function?

   (b) Is g an onto function?

3. Consider the function $h : \mathbb{Z} \to \mathbb{N}$ given by $h(x) = \begin{cases} 2x & \text{if } x \geqslant 0 \\ -2x - 1 & \text{if } x < 0 \end{cases}$.

(a) Is h a one-to-one function?

(b) Is h an onto function?