Read chapters 8 and 9 of the textbook
Main skills. You need to understand:

- The definition of function
- how to decide if a function is injective, surjective or bijective
- the definition of composition.
- The definition of inverse f^{-1} of a function f.

Do the following problems from your textbook:

- p. 99: 8.2
- p 113: 9.1
- p 118: 19

. Do the following additional problems.

1. Define a function $f : Z \to Z$ by:

$$f(x) = \begin{cases} n+1 & \text{if } n \text{ is even} \\ n+2 & \text{if } n \text{ is odd} \end{cases}$$

   (a) Is f injective ? Prove your answer.
   (b) Is f surjective ? Prove your answer.

2. Define a function $f : Z \to Z$ by $f(x) = x + 5$.

   (a) Compute $f^2(x) = f(f(x))$
   (b) Compute $f^3(x)$
   (c) Find and prove a formula for $f^n(x)$.

3. Let $d : Z^+ \to Z^+$ be defined by $d(x)$= number of positive divisors of x. For example $d(6) = 4$ because 6 is divisible by 1, 2,3,and 6.

   (a) Describe the set $S = \{x \in Z^+ | d(x) = 2\}$.
   (b) Is d injective ?
   (c) Make a conjecture for a formula for $d(2^n)$ (i.e write $d(2^n)$ = formula in n) for $n \geq 0$ and prove your formula .
   (d) is d surjective ?

4. Give examples of functions $f\ A \to B$ and $g\ B \to C$ that satisfy the following conditions, or explain why no example exists:

   (a) g surjective $g \circ f$ not surjective
   (b) g injective $g \circ f$ not injective.
   (c) f not injective $g \circ f$ injective.