INVERSE FUNCTIONS

One-to-One Functions

- A function f is called a **one-to-one** (abbreviated "1-1") function if it never takes the same value twice; that is:

  Whenever $x_1 \neq x_2$, then $f(x_1) \neq f(x_2)$
- **Horizontal Line Test**: a function is 1-1 iff no horizontal line intersects its graph more than once.

Inverse Functions

- Let f be a 1-1 function with domain A and range B. Then its **inverse** function f^{-1} has domain B and range A and is defined by:

  $f^{-1}(y) = x \Leftrightarrow f(x) = y$

  Note that domain of f^{-1} = range of f and range of f^{-1} = domain of f.

Note:

- Do not mistake the -1 in f^{-1} for an exponent:

  $x^{-1} = 1/x$, but $f^{-1}(x) \neq 1/f(x)$
- However, $[f(x)]^{-1} = 1/f(x)$

Cancellation Equations

- If a function f from domain A to range B has an inverse function f^{-1}, then:

  For every x in A $f^{-1}(f(x)) = x$

  For every x in B $f(f^{-1}(x)) = x$