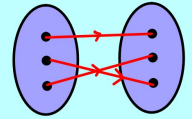# Functions

When function *f* is a one-to-one correspondence from A to B, there exists an INVERSE function, f^{-1}, that maps B to A.

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

$$f^{-1}(f(x)) = x = f\left(f^{-1}(x)\right)$$

i.e. for any value *y* there is a unique value of *x*

Example

$$f(x) = 4x^2 + 1$$

$$y = 4x^2 + 1$$

$$4x^2 = y - 1$$

$$x^2 = \frac{y-1}{4}$$

$$x = \frac{\sqrt{y-1}}{2} \qquad \text{(taking positive root)}$$

So $\quad f^{-1}(x) = \frac{\sqrt{x-1}}{2}$

** The Domain and Range of f^{-1} give the Range and Domain of *f* **

Function	*Domain*	*Range*	*Graph*
$f(x) = 4x^2 + 1$	$x \geq 0,\ x\epsilon\mathbb{R}$	$y \geq 1,\ y\epsilon\mathbb{R}$	
$f^{-1}(x) = \frac{\sqrt{x-1}}{2}$	$x \geq 1,\ x\epsilon\mathbb{R}$	$y \geq 0,\ y\epsilon\mathbb{R}$	

Note

The graph of $y = f^{-1}(x)$ is the reflection of the graph of $y = f(x)$ in the line $y = x$