

$f : A \rightarrow B$  is 1:1 iff  $f(x) = f(y)$  implies  $x = y$ .

$f : A \rightarrow B$  is 1:1 iff  $x \neq y$  implies  $f(x) \neq f(y)$ .

$f : A \rightarrow B$  is 1:1 iff for all  $x \neq y$ ,  $f(x) \neq f(y)$ .

$f : A \rightarrow B$  is NOT 1:1 iff there exists  $x \neq y$  such that  $f(x) = f(y)$ .

Determine if the following functions are 1:1. If they are not 1:1, prove it.

1.)  $f : \mathbb{R} \rightarrow \mathbb{R}$ ,  $f(x) = x^2$

2.)  $f : [0, \infty) \rightarrow \mathbb{R}$ ,  $f(x) = x^2$

3.)  $f : [0, \infty) \rightarrow [0, \infty)$ ,  $f(x) = x^2$

4.)  $f : \mathbb{R} \rightarrow \mathbb{R}$ ,  $f(x) = x^3$

5.)  $f : \mathbb{R} \rightarrow \mathbb{R}$ ,  $f(x) = 2$

6.)  $f : \mathbb{R} \rightarrow \mathbb{R}$ ,  $f(x) = 8x + 2$

7.)  $f : \mathbb{R} \rightarrow \mathbb{R}$ ,  $f(x) = x^2 + 3x$

8.)  $f : \mathbb{R} \rightarrow \mathbb{R}$ ,  $f(x) = e^x$

9.)  $f : \mathbb{R} \rightarrow \mathbb{R}$ ,  $f(x) = x^4 + x^2$

10.)  $f : \mathbb{R} \rightarrow \mathbb{R}$ ,  $f(x) = \sin(x)$