

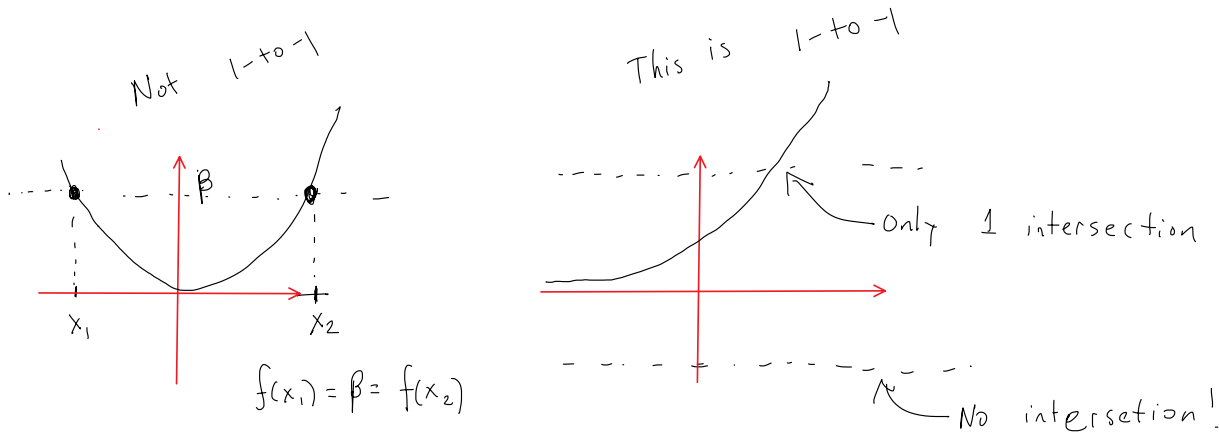
One-to-one functions

Sunday, February 22, 2015 6:04 PM

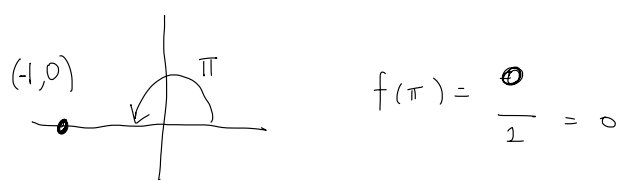
A function <sup>[Equation]</sup> is said to be *one-to-one* if it never takes the same value twice.

In other words if  $a \neq b$  then  $f(a) \neq f(b)$

Horizontal Line Test. A function is one-to-one if any horizontal line intersects its graph at most once.



Example Is  $f(x) = \sin x$  1-to-1 ?  
 $f(0) = \sin 0 = 0 = f(\pi) = \sin \pi$

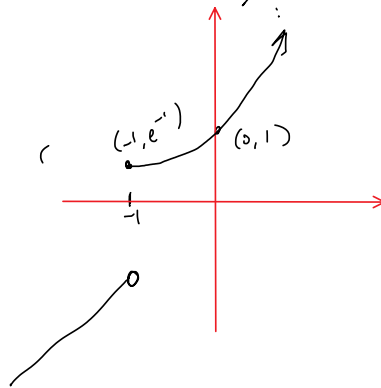
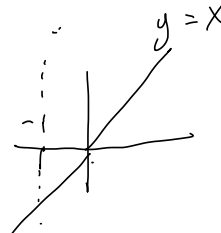
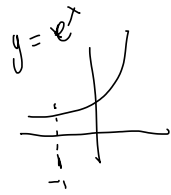


So  $f(0) = f(\pi)$  &  $0 \neq \pi$   
 this mean  $f(x) = \sin x$  is not 1-to-1

Example Consider  $f(x) = \begin{cases} e^x & \text{if } x \geq -1 \end{cases}$  (Use this formula when  $x \geq -1$ )  
 $\begin{cases} x & \text{if } x < -1 \end{cases}$  ← otherwise use this

$f(0) = e^0 = 1$      $f(-1) = e^{-1}$      $f(2) = e^2$   
 $f(-5) = -5$

Graph of  $f(x)$



combine these two graphs:

← The graph of  $f(x)$

By Horizontal line test it is 1-to-1.