Answer on Question #66203 – Math – Calculus

Question

Give an example each with justification, of a function defined on]-1, 1[which is
i) one-one but not onto.
ii) onto but not one-one.

Solution

i) Let

$$f:\left]-1,1\right[\to R,\ f(x)=x.$$

Then f is one-one but not onto.

Proof

(*one-one*): Suppose

$$f(x)=f(y).$$

So

$$x=y.$$

(*not onto*): For example, there is no x from]-1,1[such that $f(x)=2$.

ii) Let

$$f:\left]-1,1\right[\to[0,1),\ f(x)=x^2.$$

Then f is onto but not one-one.

Proof

(*onto*): For every y from $[0,1)$ there is x such that $f(x)=y$.

(*not one-one*): Function produces the same values for x and $-x$, that is, $f(x)=f(-x)$.

Answer: i) $f:\left]-1,1\right[\to R,\ f(x)=x$; **ii)** $f:\left]-1,1\right[\to[0,1),\ f(x)=x^2$.