Inverse of a Function

switch x values & y values

An inverse of a function can be obtained by:

1) mapping $(x,y) \rightarrow (y,x)$
2) reflecting the graph of the function over the line $y=x$

Example 1 ("points")

Given $f=\{(2,3),(5,9),(7,1)\}$, find the inverse.
State the domain and range of the f and of the f^{-1}.

$f=\{(2,3),(5,9),(7,1)\}$ $D=\{x \mid 2,5,7\}$ $R=\{y \mid 1,3,9\}$

inverse function

$f^{-1}=\{(3,2),(9,5),(1,7)\}$ $D=\{x \mid 1,3,9\}$ $R=\{y \mid 2,5,7\}$

Domain & Range switch

Example 2 ("graph")

(a) Graph the function $f(x) = (x+3)^2+1$ and also graph the inverse function.
(b) State the domain and range of $f(x)$ and of $f^{1}(x)$.
(c) Is the inverse also a function?
(d) Restrict the domain of f(x) so that the inverse is a function.

Example 3 ("equations")

Find the inverse equation of each of the following functions:

(a) $f(x)=3x+4$
(b) $g(x)=x^3-1$
(c) $h(x)=-x$
(d) $m(x)=-2(x+5)$

2. $f(x) = (x+3)^2 + 1$

$(x, y) \rightarrow (x-3, y+1)$

$y = x^2$

X	Y
-3	9
-2	4
-1	1
0	0
1	1
2	4
3	9

"parent"

$y = (x+3)^2 + 1$

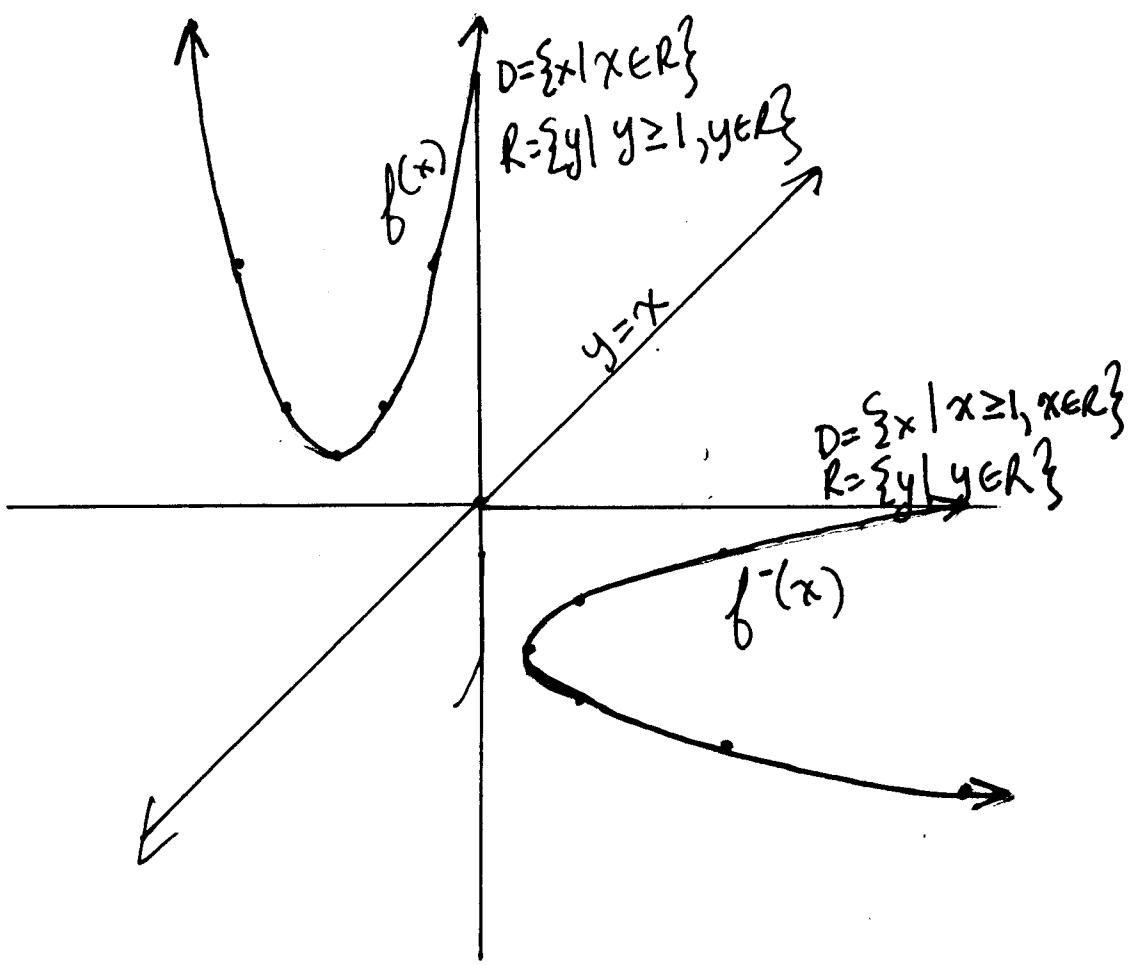
X	Y
-6	10
-5	5
-4	2
-3	1
-2	2
-1	5
0	10

"the function"

the inverse

X	Y
10	-6
5	-5
2	-4
1	-3
2	-2
5	-1
10	0

"the Inverse"



(a) $f(x) = 3x+4$

$y = 3x+4$

$\boxed{\text{INV}}$ $x = 3y+4$

$x-4 = 3y$

$\frac{x-4}{3} = y$

$f^{-1}(x) = \frac{x-4}{3}$

(b) $g(x) = x^3-1$

$y = x^3-1$

$\boxed{\text{INV}}$ $x = y^3-1$

$x+1 = y^3$

$\sqrt[3]{x+1} = y$

$g^{-1}(x) = \sqrt[3]{x+1}$

$h^{-1}(x) = -x$

$m^{-1}(x) = \frac{-x}{2} - 5$ ✓

$m^{-1}(x) = \frac{-x-10}{2}$ ✓