Study Guide

Notes and Examples

To find the inverse
- Switch x and y
- Solve for y -get y by itself

The original equation is $y = 4x - 5$
The inverse is $x = 4y - 5$
Solve for y.

$$4y - 5 = x$$
$$4y = x + 5$$
$$y = \frac{x+5}{4}$$

Therefore, $f^{-1} = \frac{x+5}{4}$

$f(x) = -\sqrt{x-1}$
$y = -\sqrt{x-1}$
$x = -\sqrt{y-1}$ Swap x and y
$(x)^2 = \left(-\sqrt{y-1}\right)^2$
$x^2 = y - 1$ Solve y
$x^2 + 1 = y$

$f^{-1}(x) = x^2 + 1 \{\text{Domain: } x \le 0, \text{ Range: } y \ge 1\}$

For you to do

$y = 5x - 30$ $y^{-1} = \frac{x+30}{5}$ or $\frac{x}{5} + 6$
$y = \frac{2}{7}x - 30$ $y^{-1} = \frac{7x}{2} + 105$

$y = \frac{3}{x-4} + 2$ $x = \frac{3}{y-4} + 2$
$x - 2 = \frac{3}{y-4}$
$\frac{(y-4)(x-2)}{x-2} = \frac{3}{x-2}$
$y - 4 = \frac{3}{x-2}$
$y^{-1} = \frac{3}{x-2} + 4$

$y = \sqrt{x+5} - 2$
$y^{-1} = (x+2)^2 - 5$
$x \ge -2$

$y = (9x+3)^2 + 7$
$y^{-1} = \frac{\sqrt{x-7} - 3}{9}$
Restrictions
$x > \frac{1}{3}$ $y \ge 7$
$y > -\frac{1}{3}$ $x \ge 7$

Since it was the positive $\sqrt{}$ we only want the right side of parabola

Finding Inverse of a relation

Definition

- A function is a set of ordered pairs with no two first elements alike.
  - f(x) = { (x,y) : (3, 2), (1, 4), (7, 6), (9,12) }
- But ... what if we reverse the order of the pairs?
  - This is also a function ... it is the inverse function
  - $f^{-1}(x)$ = { (x,y) : (2, 3), (4, 1), (6, 7), (12, 9) }

Find the inverse of the relation.

f(x)={(3,5),(8,6),(-4, 5),(2,-60}
$f^{-1}(x) = \{(5,3)(6,8)(5,-4)(-60,2)\}$

f(x)={(3,2),(9,6),(-1, 5),(7,0}
$f^{-1}(x) = \{(2,3)(6,9)(5,-1)(0,7)\}$

The function $f(x)$ is invertible. Find $f^{-1}(-77)$.

x	f(x)
-97	-77
-92	56
-87	79
-82	-24
-77	51

this like $y = -77$

$f^{-1}(-77) =$ -97

Find

f(5)= 25

$f^{-1}(4) \Rightarrow y = 4 \Rightarrow$ 2

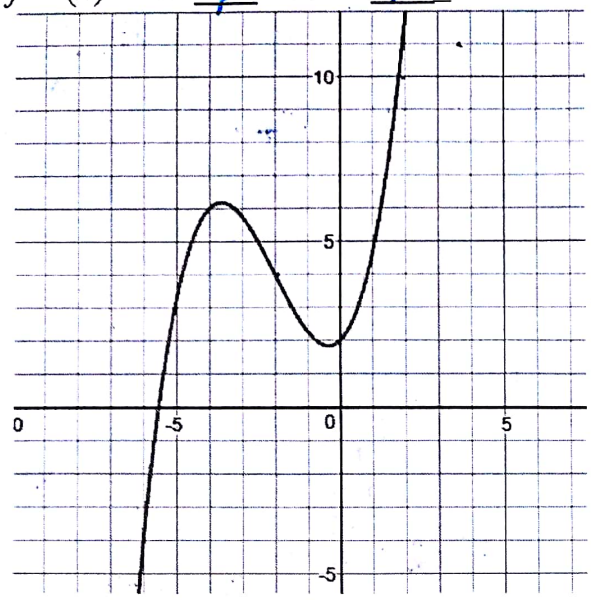
f(2)= 4

$f^{-1}(9) \Rightarrow y = 9 \Rightarrow$ 3

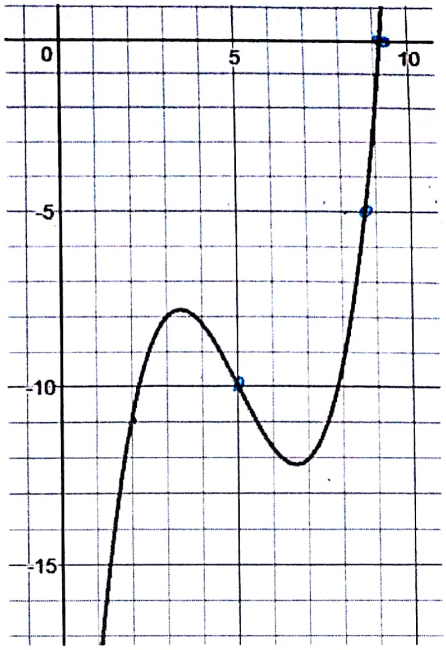
x	y
1	1
2	4
3	9
4	16
5	25

f(x) use X to find y

$f^{-1}(x)$ use y to find X



f(-2)=4 $f^{-1}(10) \approx 2$



f(5)= -10 $f^{-1}(-5) =$ 8.75

f(+2)= -11 $f^{-1}(0) =$ 9.1

f is the inverse of h

If f(18)=10 then...h(10)=18

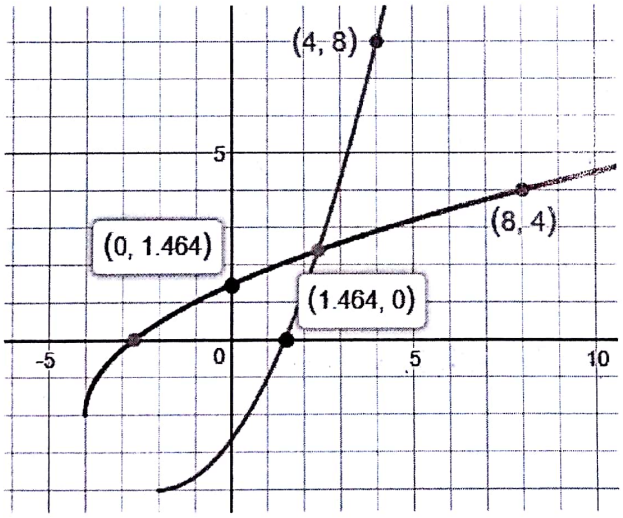
2f(18) -3h(10)= → 36-30 → . =6.✓

r is the inverse of t

If t(8)=5 15 16

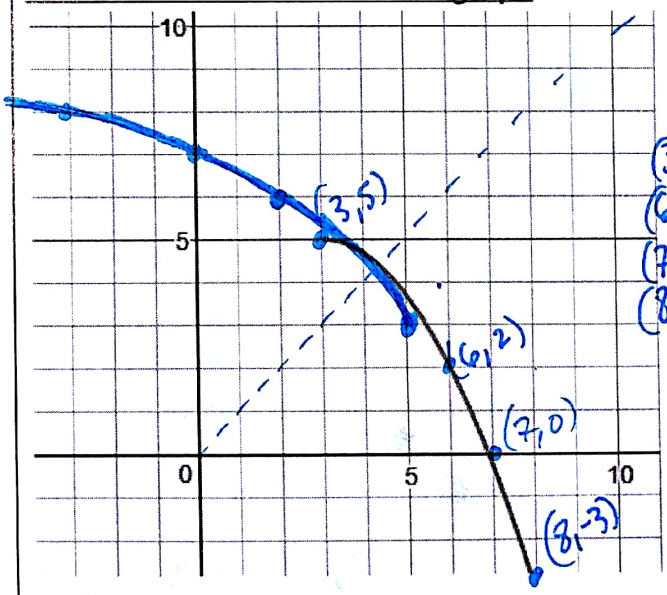
r(5)= 8 3t(8) +2 r(5)= 31

Honors: r(t(8))= 8



Note: functions have points where x and y are switched so we know they are inverses. Also they reflect over the line y=x

Draw an inverse on the same graph



get points

flip coordinates

(3,5) → (5,3)

(6,2) → (2,6)

(7,0) → (0,7)

(8,-3) → (-3,8)

Write the function for this scenario. On test you get 5 points for your name and 4 points for every question right.

What does x represent in the inverse of this function.?

f(x)=4x+5 $f^{-1}(x) = \frac{x-5}{4}$

X represents the amount of right answers in the inverse function

Function: Your first year at a company you get 7 days of vacation and every 5 years after that you get 2 more days.

years = x day = y

input: years to find

x output: days

y

What does $f^{-1}(x)$ represent?

Years

$f^{-1}(x)$ means x values of original

thats how you know x and y

$y = 7 + \frac{2}{5}x$