U3D6_T INVERSES continued

Monday, March 18, 2019 6:45 PM

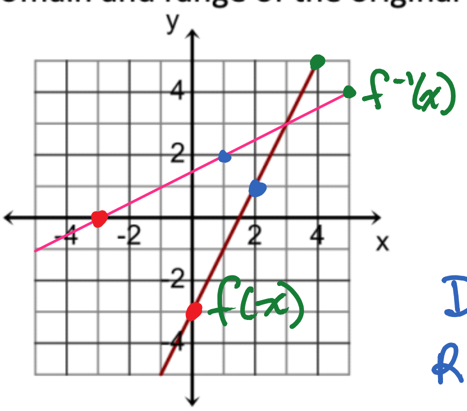
U3D6_T INVERSES ...

U3D6 MCR 3UI *Inverses Continued....*

Warm Up: A) State the inverse of P = {(2,3), (4,5),(9,-2)}

$P^{-1} = \{(3,2), (5,4), (-2,9)\}$

B) Graph the inverse of each of the following and identify domain and range of the original and the inverse graph:



$(0,-3) \rightarrow (-3,0)$

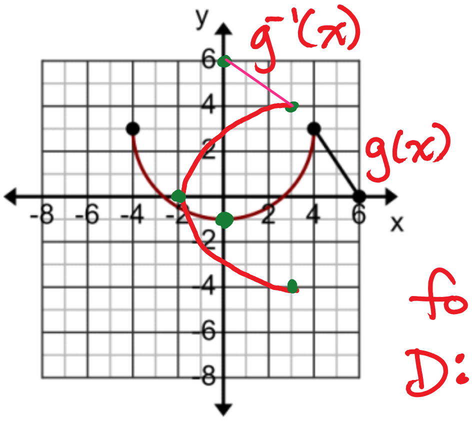
$(2,1) \rightarrow (1,2)$

$(4,5) \rightarrow (5,4)$

D: $\{x \in \mathbb{R}\}$

R: $\{y \in \mathbb{R}\}$

for both $f^{-1}(x)$, $f(x)$.



$(-4,3) \rightarrow (3,-4)$

$(0,-2) \rightarrow (-2,0)$

$(4,3) \rightarrow (3,4)$

$(6,0) \rightarrow (0,6)$

for $g(x)$, D: $\{-4 \le x \le 6\}$ R: $\{-1 \le y \le 3\}$

$g^{-1}(x)$ D: $\{-1 \le x \le 3\}$ R: $\{-4 \le y \le 6\}$

Inverses (continued):

Method for finding the equation of an inverse (continued)

$y^2 = 9$

$y = \pm\sqrt{9}$

$y = \pm 3$

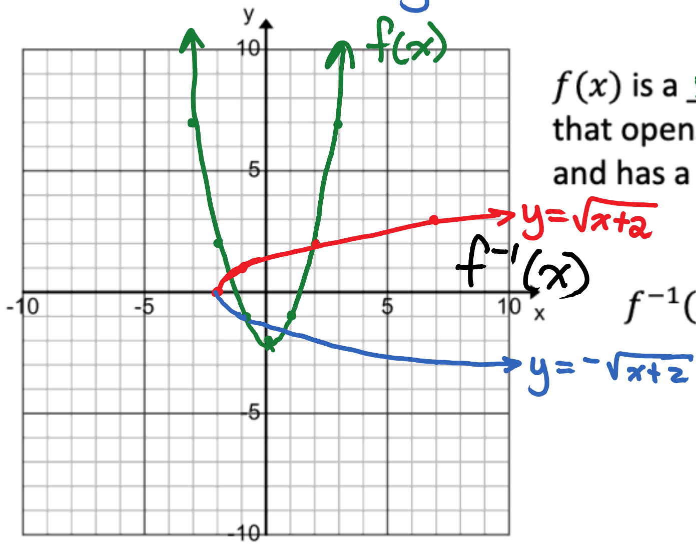
1. Determine the inverse of $f(x) = x^2 - 2$, and graph both functions.

for $f^{-1}(x)$,

$y^2 - 2 = x$

$y^2 = x + 2$

$y = \pm\sqrt{x+2}$



$f(x)$ is a parabola that opens up and has a vertex of (0 , -2).

$f^{-1}(x) \Longrightarrow \begin{cases} \sqrt{x+2} \\ -\sqrt{x+2} \end{cases}$

State the Domain and Range of each

$f(x)$

D: { $x \in \mathbb{R}$ }

R: { $y \geq -2$ }

$f^{-1}(x)$

D: { $x \geq -2$ }

R: { $y \in \mathbb{R}$ }

Is $f^{-1}(x)$ a function? No.

Is it possible to make $f^{-1}(x)$ a function?

No. Although, we can separate it into two functions.

2. Determine the equation of the inverse for each of the following functions and identify if the inverse is a function:

a. $q(x) = \frac{1}{x-2}$, $x \neq 2, y \neq 0$

for $q^{-1}(x)$,

$\frac{1}{y-2} = \frac{x}{1}$ take reciprocal on both sides

$\frac{y-2}{1} = \frac{1}{x}$ isolate y

$y = \frac{1}{x} + 2$

$\therefore q^{-1}(x) = \frac{1}{x} + 2$, $x \neq 0, y \neq 2$

b. $f(x) = 5x^2 - 2$

for $f^{-1}(x)$,

$$5y^2 - 2 = x$$
$$5y^2 = x + 2$$
$$y^2 = \frac{x+2}{5}$$
$$y = \pm\sqrt{\frac{x+2}{5}}$$
$$\therefore\ f^{-1}(x) = \pm\frac{\sqrt{x+2}}{\sqrt{5}}$$

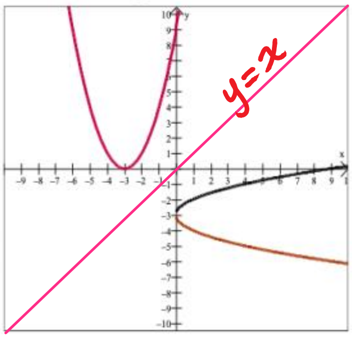
c. $g(x) = 3x^2 - 6x + 11$

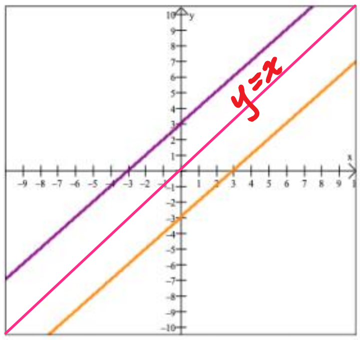
for $g^{-1}(x)$,

$$3y^2 - 6y + 11 = x$$
$$3(y^2 - 2y) = x - 11$$
$$3(\overbrace{y^2 - 2y + 1} - 1) = x - 11$$
$$3(y-1)^2 - 3 = x - 11$$
$$3(y-1)^2 = x - 11 + 3$$
$$(y-1)^2 = \frac{x-8}{3}$$
$$y - 1 = \pm\sqrt{\frac{x-8}{3}}$$
$$y = 1 \pm \frac{\sqrt{x-8}}{\sqrt{3}}$$
$$\therefore\ g^{-1}(x) = 1 \pm \frac{\sqrt{x-8}}{\sqrt{3}}$$

Reflective Property for Inverses

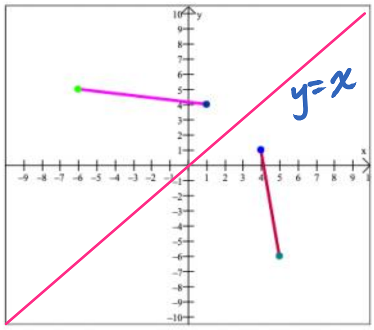
The following are inverses of each other.





Note:

The inverse in the first graph is not a function due to the VLT vertical line test.



The graph of $y = f^{-1}(x)$ is the reflection of the graph $y = f(x)$ in the line $\underline{y=x}$.

The cost of a pizza is \$8 plus \$1.25 per topping.

a) Write an equation of Cost as a function of number of toppings.

$C(n) = 8 + 1.25n$, where n is the number of toppings, C is the total cost (\$).

b) State the domain and range. Assume 23 toppings are available.

D: $\{n \in W,\ n \leq 23\}$

R: $\{8, 9.25, 10.50, \ldots, 36.75\}$

$$\begin{array}{r} 23 \\ +\ 5.75 \\ \hline 28.75 \\ +8 \end{array}$$

c) Find the inverse, and explain its meaning.

$8 + 1.25n = C$

$\frac{4}{5} \times 1.25n = (C-8) \times \frac{4}{5}$ note: $1.25 = \frac{5}{4}$

$n = \frac{4(C-8)}{5}$

n is a function of C

If I want to spend a certain amount, it will tell me how many toppings I can have.

U3D6 Practice: p. 215 #10 ii,v, 12, 13cg, 14iv, vi, 15b, **22, 23**