

6-7

C.4

Inverse Relations and Functions

Objective To find the inverse of a relation or function

An **inverse** of a function is a relation where the domain of the original function becomes the range of it's inverse (*and vice versa*)

Notation Note!
This means the inverse of relation r

Is r a function?

Relation r	
Domain	Range
1.2	→ 1
1.4	→ 1
1.6	→ 2
1.9	→ 2

Is r^{-1} a function?

Inverse of r	
Domain	Range
1	→ 1.2
1	→ 1.4
2	→ 1.6
2	→ 1.9

What is a function? A **function** is a relation where each input has a single output. *Domain values cannot be used more than once!!!*

Jan 24-2:31 PM

1. a. What are the graphs of t and its inverse?
 b. **Reasoning** Is t a function? Is the inverse of t a function? Explain.

Relation t	
x	y
-2	4
-1	1
0	0
1	1
2	4

Yes

Inverse t^{-1}	
x	y
4	-2
1	-1
0	0
1	1
4	2

No

Jan 24-2:38 PM

1

Problem 2 Finding an Equation for the InverseTo Find the equation of the Inverse...

1. switch the x and y * $f(x) = y$ *
2. solve for y

Ex. What is the inverse of $y = 2x + 8$?

Is the inverse a function?

$$x = 2y + 8$$

-8 -8

$$\frac{x-8}{2} = \frac{2y}{2}$$

$$y = \frac{1}{2}x - 4$$

Yes,
a function

Jan 24-2:39 PM

Ex. What is the inverse of the relation described by $y = x^2 - 1$?

Is the inverse a function?

$$x = y^2 - 1$$

+1 +1

$$\sqrt{x+1} = \sqrt{y^2}$$

$$y = \pm \sqrt{x+1}$$

Not a function

Feb 6-9:16 AM

Ex. What is the inverse of $f(x) = \sqrt{x-3} + 5$
Is the inverse a function?

$$y = \sqrt{x-3} + 5$$

$$x = \sqrt{y-3} + 5$$

$$(x-5)^2 = (\sqrt{y-3})^2$$

$$(x-5)^2 = y-3$$

$$y = (x-5)^2 + 3 \quad (\text{vertex form})$$

$$y = x^2 - 10x + 28 \quad (\text{standard form})$$

Yes, a function

Mar 20-8:30 AM

Problem 4 Finding an Inverse Function

Consider the function $f(x) = \sqrt{x-2}$.

A What are the domain and range of f ?

$$D: x \geq 2$$

$$R: y \geq 0$$

B What is f^{-1} , the inverse of f ?

$$f^{-1}(x) = x^2 + 2$$

C What are the domain and range of f^{-1} ?

$$D: x \geq 0$$

$$R: y \geq 2$$

D Is f^{-1} a function? Explain.

Yes

Jan 24-2:42 PM

Problem 4 Finding an Inverse FunctionConsider the function $f(x) = x^2 + 5$ **A** What are the domain and range of f ?

$$D: x: \text{all } \mathbb{R}$$

$$R: y \geq 5$$

C What are the domain and range of f^{-1} ?

$$D: x \geq 5$$

$$R: y: \text{all } \mathbb{R}$$

B What is f^{-1} , the inverse of f ?

$$f^{-1}(x) = \pm\sqrt{x-5}$$

D Is f^{-1} a function? Explain.

No

Jan 24-2:42 PM

HW :

p.410:

10,13,16,18,
30,31,32,34
52,54,57

Feb 19-8:37 AM