

Homework Answers (14 problems)

Section 1.4 Quick Review (page 10 a
34): b

4 c

5

6

7

8

9 a
b

Section 1.4 (page 34):

1

2

3

4

Notes

Overview

- One-to-One Functions and the Horizontal Line test.
- Inverse functions.
- Testing for inverses graphically.
- Finding the inverse algebraically.

Notes

One-to-One Functions and the Horizontal Line test

Definition (One-to-One Functions)

A function $f(x)$ is *one-to-one* on a domain D if $f(a) \neq f(b)$ whenever $a \neq b$.

Definition (Horizontal Line Test)

If the graph of a function $y = f(x)$ intersects any horizontal line at most once, then $f(x)$ is one-to-one.

Example

Which of these functions is one-to-one?

- $y = |x|$
- $y = \sqrt{x}$
- $y = x^2$
- $y = \frac{1}{x}$

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Inverse Functions

Notes

Definition (Inverse Function)

If f is a one-to-one function, then the *inverse* of f , written as f^{-1} , reverses f by using the output to calculate the input.

Example

If f is one-to-one, and $f(2) = 5$, then $f^{-1}(5) = 2$.

Problem

If $f(x) = 2x + 5$, what is $f^{-1}(3)$?

Testing Inverse Functions

Notes

Method

Given two functions $f(x)$ and $g(x)$, if $f(g(x)) = x$ or $g(f(x)) = x$, then f and g are inverses of one another.

Method (Graphing the Inverse)

To graph the inverse of a function, exchange the x and y coordinates of every point on the graph. This is equivalent to reflecting the graph along the diagonal line $y = x$.

Method (Graphing the Inverse Parametrically)

To graph a function $y = f(x)$ as a parametric function, set $x = t$ and $y = f(t)$. To graph the inverse, set $x = f(t)$ and $y = t$. The domain interval of t will be the domain of $f(x)$.

Graphing Parametrically

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Example

Graph the line $y = x^2, x \geq 0$, together with its inverse and the line $y = x$.

- Convert the function to parametric. Let $x = t$ and $y = t^2$ over the domain $0 \leq t \leq \infty$.
- Use the graphing calculator in parametric mode to graph this function as x_1 and y_1 .
- Graph the inverse, $x_2 = t^2$ and $y_2 = t$, as x_2 and y_2 .
- Graph the line $y = x$ as $x_3 = t$ and $y_3 = t$.

Finding the inverse algebraically

Method

To find the inverse of $y = f(x)$ algebraically:

- Interchange the x 's and y 's in the equation.
- Solve the new equation for y ,
- The resultin equation will be $f^{-1}(x)$

Example ($y = 4x+3$)

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

Notes

Homework

Section 1.4 (page 44): 2 - 24 even (12 points)

2	14
4	16
6	18
8	20
10	22
12	24

Notes

Notes