Homework 12

Inverse Functions, Exponential Functions, and Logarithms

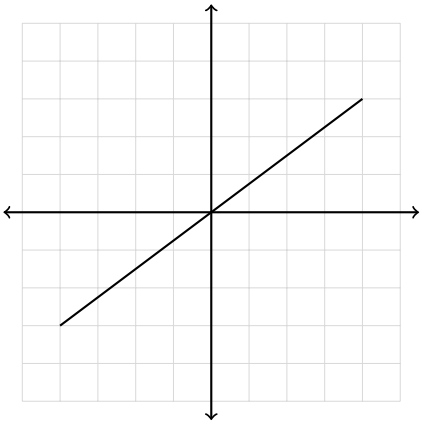
Name: _____

Show all algebraic steps clearly. Write exact answers whenever possible.

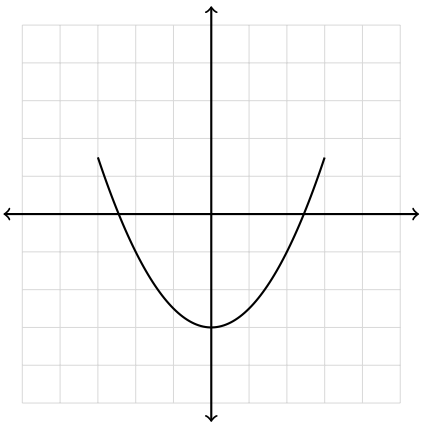
Part I: Horizontal Line Test and Inverse Functions

1. Determine whether each graph represents a one-to-one function using the horizontal line test.

   (a) Linear Function



   (b) Quadratic Function



2. The given coordinates are on $f(x)$. Find the coordinates for $f^{-1}(x)$.

(a)

$$(-2, 4)$$

(b)

$$(4, -7)$$

(c)

$$(0, 11)$$

Part II: Find the Algebraic Inverse

Find the inverse of each function.

(a)

$$f(x) = 15x - 1$$

(b)

$$f(x) = \frac{1}{4}x - 2$$

(c)

$$f(x) = 3x + 8$$

Part III: Exponential and Logarithmic Forms

Write each exponential equation in logarithmic form.

(a)

$$3^7 = 2187$$

(b)

$$12^2 = 144$$

(c)

$$5^3 = 125$$

Write each logarithmic equation in exponential form.

(a)

$$\log_{10}(100000) = 5$$

(b)

$$\log_4(1024) = 5$$

(c)

$$\log_9(729) = 3$$

Part IV: Evaluate Logarithms Without a Calculator

Evaluate using mental math.

(a)

$$\log(1{,}000{,}000)$$

(b)

$$\log(10)$$

(c)

$$\log(1)$$

(d)

$$\log_4(16)$$

(e)

$$\log_8(1)$$

(f)

$$\log_5(625)$$

Part V: Solve Basic Exponential and Logarithmic Equations

Solve each equation.

(a)

$$\log_3(x-1) = 2$$

(b)

$$\log_2(x+5) = 4$$

(c)

$$6^x = \frac{1}{36}$$

(d)

$$5^x = 125$$

Part VI: Applications

(a) To convert from x degrees Celsius to y degrees Fahrenheit, we use the formula

$$y = \frac{9}{5}x + 32$$

Find the formula to convert from Fahrenheit to Celsius.

(b) The function

$$P(t) = 2000(1.05)^t$$

models the value of an investment after t years.

i. Find $P(3)$.

ii. Explain the meaning of your answer.

(c) A bacteria population doubles every hour and is modeled by

$$P(t) = 50(2)^t$$

Find the population after 4 hours.