

# Day 02 HW on Inverse Functions and Relations

Name Key  
Date \_\_\_\_\_ Block \_\_\_\_\_

1-2: Find the inverse of the given function.

1.

|   |    |    |   |   |   |
|---|----|----|---|---|---|
| x | 1  | 2  | 3 | 4 | 5 |
| y | -6 | -3 | 0 | 3 | 6 |

$$\{(-6, 1), (-3, 2), (0, 3), (3, 4), (6, 5)\}$$

2.  $\{(7, 7), (4, 9), (3, -2)\}$

$$\{(7, 7), (9, 4), (-2, 3)\}$$

3-6: Verify that f and g are inverse functions by showing that  $f(g(x)) = g(f(x)) = x$ .

3.  $f(x) = 1 - x, g(x) = 1 - x$

$$\begin{aligned} f(g(x)) &= 1 - (1 - x) \\ &= 1 - 1 + x \\ &= x \end{aligned}$$

$$\begin{aligned} g(f(x)) &= 1 - (1 - x) \\ &= 1 - 1 + x \\ &= x \end{aligned}$$

4.  $f(x) = -3x + 6, g(x) = -\frac{1}{3}x + 2$

$$\begin{aligned} f(g(x)) &= -3\left(-\frac{1}{3}x + 2\right) + 6 \\ &= x - 6 + 6 = x \end{aligned}$$

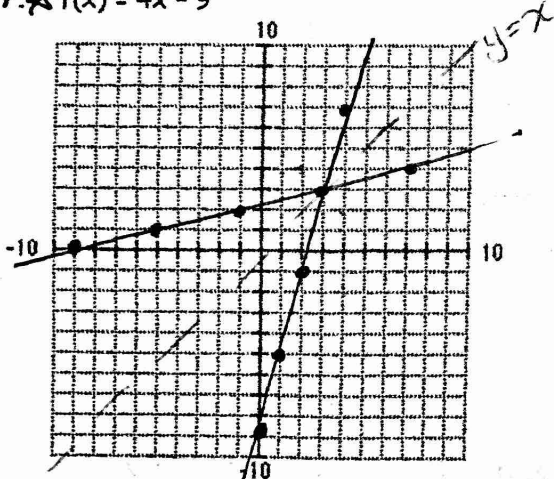
$$\begin{aligned} g(f(x)) &= -\frac{1}{3}(-3x + 6) + 2 \\ &= x - 2 + 2 = x \end{aligned}$$

5.  $f(g(2)) = 2$   $g(f(2)) = 2$

6.  $f(g(2)) = 2$   $g(f(2)) = 2$

7-10: Graph the given function and its inverse on the same set of axes. Use a color for your inverse function. Then find the equation for the inverse of each function solved for y using the proper notation!

7.  $f(x) = 4x - 9$



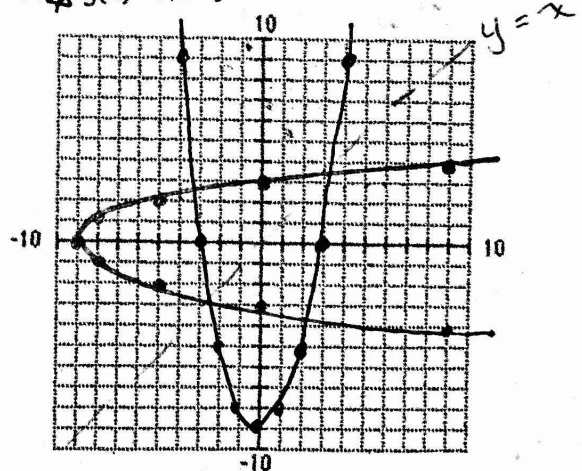
$$\begin{aligned} x &= 4y - 9 \\ x + 9 &= 4y \end{aligned}$$

$$\frac{1}{4}(x + 9) = y$$

$$f^{-1}(x) = \frac{1}{4}(x + 9)$$

$$\begin{aligned} D: &(-\infty, \infty) \\ R: &(-\infty, \infty) \end{aligned}$$

8.  $g(x) = x^2 - 9$



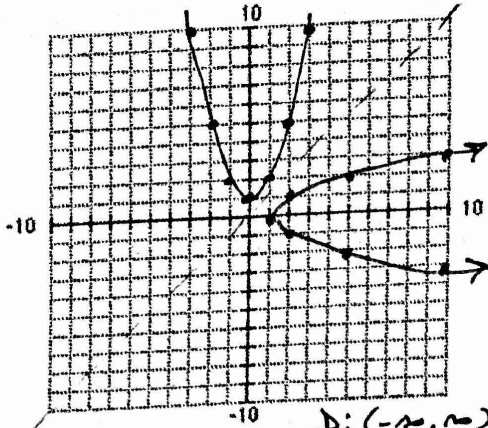
$$\begin{aligned} x &= y^2 - 9 \\ x + 9 &= y^2 \end{aligned}$$

$$\pm\sqrt{x + 9} = y$$

$$y^{-1} = \pm\sqrt{x + 9}$$

$$\begin{aligned} D: &[-9, \infty) \\ R: &(-\infty, \infty) \end{aligned}$$

9.  $f(x) = x^2 + 1$

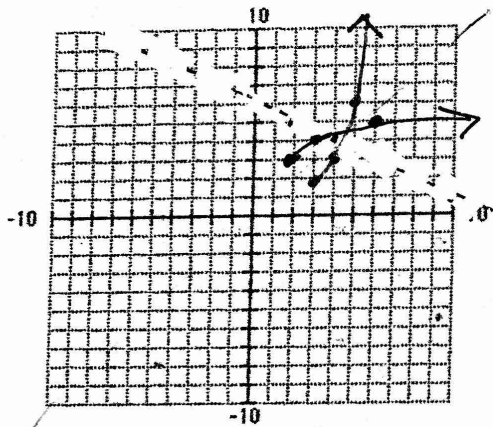


$x = y^2 + 1$   
 $\sqrt{x-1} = y^2$   
 $\pm\sqrt{x-1} = y$   
 $y^{-1} = \pm\sqrt{x-1}$

$D: (-\infty, \infty)$   
 $R: [1, \infty)$   
 $D: [1, \infty)$   
 $R: (-\infty, \infty)$

CHANGE

11.  $h(x) = \sqrt{x-2} + 3$

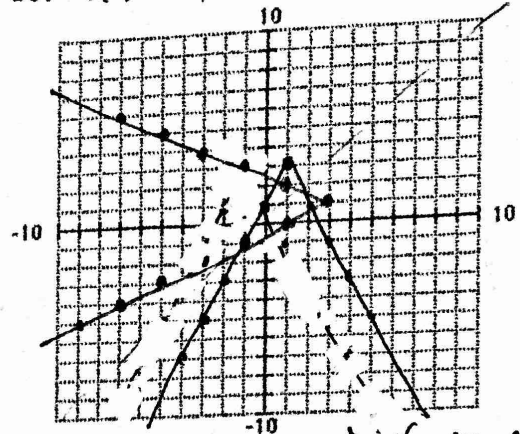


$x = \sqrt{y-2} + 3$   
 $x-3 = \sqrt{y-2}$   
 $(x-3)^2 = y-2$   
 $(x-3)^2 + 2 = y$

$D: [2, \infty)$   
 $R: [3, \infty)$   
 $D: [3, \infty)$   
 $R: [2, \infty)$

$y^{-1}(x) = (x-3)^2 + 2$  for  $x \geq 3$

10.  $f(x) = -2|x-1| + 3$   $(1, 3) \rightarrow (3, 1)$

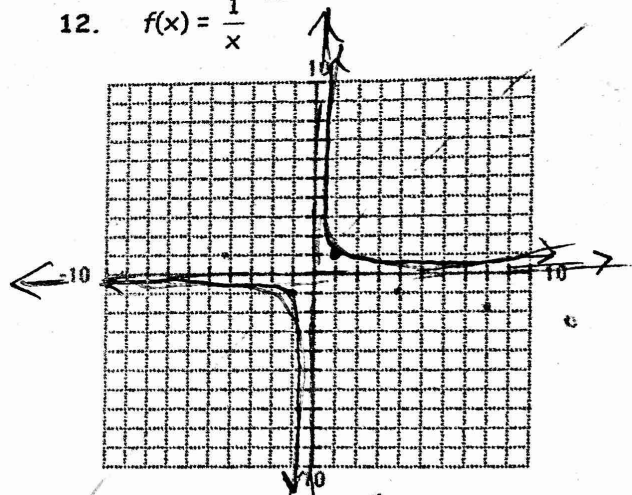


$x = -2|y-1| + 3$   
 $x-3 = -2|y-1|$   
 $-\frac{1}{2}(x-3) = |y-1|$   
 $-\frac{1}{2}(x-3) + 1 = y$      $\frac{1}{2}(x-3) + 1 = y$

$D: (-\infty, \infty)$   
 $R: (-\infty, 3]$   
 $D: (-\infty, 3]$   
 $R: (-\infty, \infty)$

$y^{-1} = \begin{cases} \pm\frac{1}{2}(x-3) + 1 & \text{for } x \leq 3 \end{cases}$

12.  $f(x) = \frac{1}{x}$



$x = \frac{1}{y}$   
 $xy = 1$   
 $y = \frac{1}{x}$

$D: (-\infty, 0) \cup (0, \infty)$   
 $R: (-\infty, 0) \cup (0, \infty)$   
 $D: (-\infty, 0) \cup (0, \infty)$   
 $R: (-\infty, 0) \cup (0, \infty)$

$y^{-1}(x) = \frac{1}{x}$