1.  a.  double trouble          **HW 6.5**
    b.  D: $\{x \mid x > -\frac{1}{2}\}$
    c.  see graph next page
    d.  R: $\{y \mid y < 0\}$

**HW 6-6 tonight: #s1-3 also state domain & range of f and f inverse like we did in notes.**

**QUIZ 2 Thurs** Days 4 & 5, operations with functions and composition.
**TEST** next Tuesday

1.  3

2.  11

3.  29

4.  $-x^2 + 5x + 2$

5.  8

6.  11

7.  $9x^2 + 6x$

8.  $3x^2 - 6x + 2$

9.  A

10.  b

11.  $-4$

12.  3

13.  5

14.  $-4$

15.  3

16.  K(30) = 303.15
     S(303.15) = 352.5 m/s

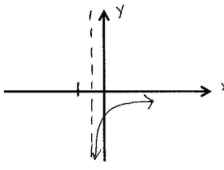Jan 16-1:07 PM

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1.  a.  State the type of trouble.                           HW 6.5
    b.  Find the domain algebraically.
    c.  Sketch the graph.
    d.  Use the graph to find the range.

$$y = \frac{-3}{\sqrt{2x+1}}$$

a.  double trouble
    var under $\sqrt{\ }$ in denom
    $2x + 1 > 0$
    $2x > -1$

c.

b.  $\{x \mid x > -\frac{1}{2}\}$        d.  $\{y \mid y < 0\}$

Given:  $f(x) = x^2 - 2x$, $g(x) = 3x + 2$, and $h(x) = \sqrt{x+1}$ find each of the following:

1.  $f(g(-1)) = f(-1) = 3$
    $g(-1) = 3(-1) + 2 = -1$
    $f(-1) = (-1)^2 - 2(-1) = 3$

2.  $g(f(-1)) = g(3) = 11$
    $f(-1) = 3$ (see #1)
    $g(3) = 3(3) + 2 = 11$

3.  $(g + h)(8) = g(8) + h(8)$
    $= 26 + 3 = 29$
    $g(8) = 3(8) + 2 = 26$
    $h(8) = \sqrt{8+1} = 3$

4.  $(g - f)(x) = g(x) - f(x)$
    $= 3x + 2 - x^2 + 2x$
    $= -x^2 + 5x + 2$

5.  $(g \circ h)(3) = g(h(3)) = g(2) = 8$
    $h(3) = \sqrt{3+1} = 2$
    $g(2) = 3(2) + 2 = 8$

6.  $g(h(f(4))) = g(h(8)) = g(3) = 11$
    $f(4) = 4^2 - 2(4) = 8$
    $h(8) = \sqrt{8+1} = 3$
    $g(3) = 11$ (see #2)

7.  $(f \circ g)(x) = f(g(x))$
    $= f(3x + 2) = (3x+2)^2 - 2(3x+2)$
    $= 9x^2 + 12x + 4 - 6x - 4$
    $= 9x^2 + 6x$

8.  $(g \circ f)(x) = g(f(x)) = 3x^2 - 6x + 2$
    $g(x^2 - 2x) = 3(x^2 - 2x) + 2$
    $= 3x^2 - 6x + 2$

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1

9. If g(x) = 3x – 5 and h(x) = 2x – 4, then (g∘h)(x) =

$g(h(x)) = 3(2x-4) - 5$

$= 6x - 12 - 5$

   a. 6x – 17
   b. 6x – 14
   c. 5x – 9
   d. x – 1

10. If f(x) = x² + 5 and g(x) = x + 4, then f(g(x)) =

$f(x+4) = (x+4)^2 + 5$

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

$= x^2 + 8x + 16 + 5$

   a. x² + 9
   b. x² + 8x + 21
   c. 4x² + 20
   d. x² + 21

11 – 15: The graphs below are the functions y = f(x) and y = g(x). Evaluate each of the following questions based on these two graphs.

11. g(f(-2)) = $g(-2) = -4$

   $f(-2) = -2$

12. (f + g)(3) = $2 + 1 = 3$

   $f(3) + g(3)$

13. (f∘g)(4) = $f(g(4)) = 5$

   $g(4) = 2 \rightarrow f(2) = 5$

14. (f • g)(0) = $-4$

   $f(0) \cdot g(0) = 2(-2)$

15. (g∘f)(2) = $3$

   $g(f(2)) \quad f(2) = 5$

   $g(5) = 3$

y = f(x)

y = g(x)

16. Physics students are studying the effect of temperature, T, on the speed of sound, S. They find that the speed of sound in meters per second is a function of the temperature in degrees Kelvin, K, by $S(K) = \sqrt{410K}$. The degrees Kelvin is a function of the temperature in Celsius given by K(C) = C + 273.15. Find the speed of sound when the temperature is 30 degrees Celsius. Round to the nearest tenth.

$K(30) = 30 + 273.15$     $S(303.15) = \sqrt{410(303.15)}$

$= 303.15$                     $= 352.5 \ m/s$

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$\{(1,2) \ (3,4)\} \longrightarrow$ Inverse $\{(2,1),(4,3)\}$

**Inverse Relation** → the set of ordered pairs obtained by interchanging the 1st & 2nd elements of each pair of a relation. Switch x & y

Taking the inverse is the same as a reflection in the line ___ y = x ___
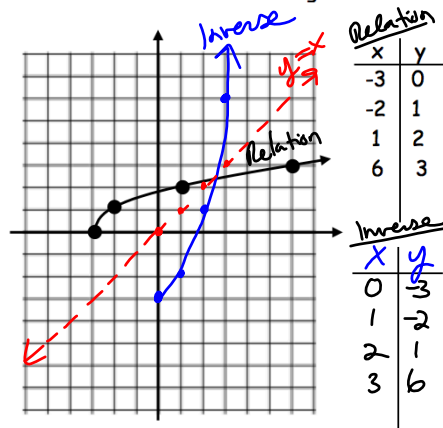
$\boxed{r_{y=x}}$
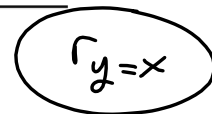
Nov 20-3:55 PM

To find an inverse graphically:

For 1 & 2:
    a.    Make a table and graph the inverse relation.
    b.    State the domain and range for the relation & inverse.
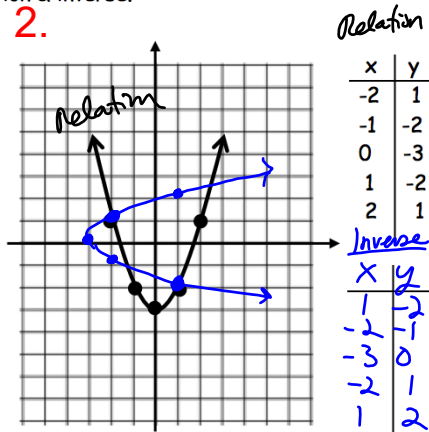
**1.**

Relation:

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

Inverse:

| X | y |
|---|---|
| 0 | -3 |
| 1 | -2 |
| 2 | 1 |
| 3 | 6 |

**2.**

Relation:

| x | y |
|---|---|
| -2 | 1 |
| -1 | -2 |
| 0 | -3 |
| 1 | -2 |
| 2 | 1 |

Inverse:

| X | y |
|---|---|
| 1 | -2 |
| -2 | -1 |
| -3 | 0 |
| -2 | 1 |
| 1 | 2 |

Relation:
D: $\{x \mid x \geq -3\}$
$[-3, \infty)$
R: $\{y \mid y \geq 0\}$
$[0, \infty)$

Inverse:
D: $\{x \mid x \geq 0\}$
$[0, \infty)$
R: $\{y \mid y \geq -3\}$
$[-3, \infty)$

Relation:
D: $\{x \mid x \in \mathbb{R}\}$
$(-\infty, \infty)$
R: $\{y \mid y \geq -3\}$
$[-3, \infty)$

Inverse:
D: $\{x \mid x \geq -3\}$
$[-3, \infty)$
R: $\{y \mid y \in \mathbb{R}\}$
$(-\infty, \infty)$
relation

What are some things that you notice about the relationship between the two function and their inverses?
They are similar but not exactly the same. D & R values switch.

Nov 20-3:56 PM

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What are some things that you notice about the relationship between the two functions and their inverses?

_____

_____

One-to-One Function (1 – 1 function) → **A function** in which each element of the range corresponds to exactly one element of the domain. Passes both the **vertical AND horizontal** line tests.

$X \longrightarrow y$
function

$X \longleftrightarrow y$
1-1 function

What do you think the **horizontal line test is**?

Jan 16-1:28 PM

**Horizontal Line Test** → A **function** is 1 – 1 if a horizontal line does not intersect the graph in more than one point.

Draw three relations that meet the following conditions: 1 that is not a function, 1 that is a function but not 1 – 1, and 1 that is a 1 – 1 function. Have your partner verify your graphs.

$y = x^3$

Relation only          Function, not 1 – 1          1 – 1 Function
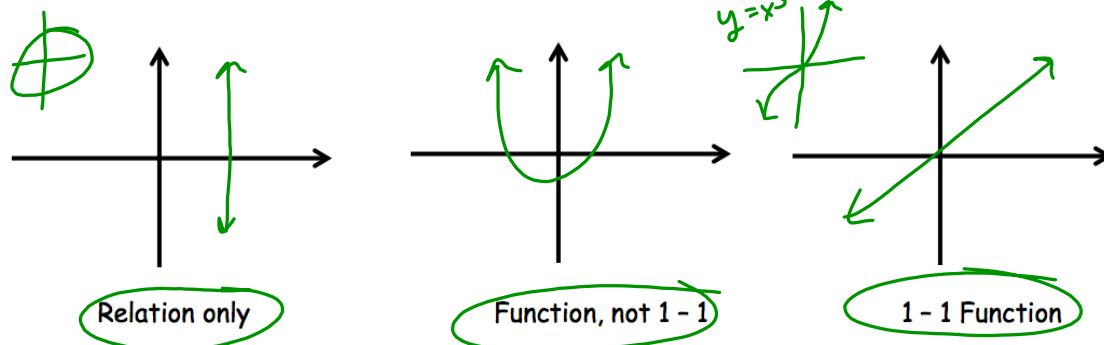
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Determine if each of the relations below are 1 – 1 functions. If not, explain why not. For equations, you can sketch or use a table of values to demonstrate your knowledge of the relation.

repeated x's

3.  {(2, 3), (3, 2), (4, 5), (5, 4)}

1-1 function
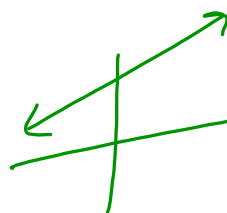
4.  {(2, -1), (3, -2), (2, -4), (-4, 3)}

not a function or 1-1

5.  $y = |x - 1|$

function, not 1-1

6.  $y = x + 44$

1-1 function

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7. Given $f(x) = 2x - 6$　No calc
   a. Make a table & graph the function & its' inverse.
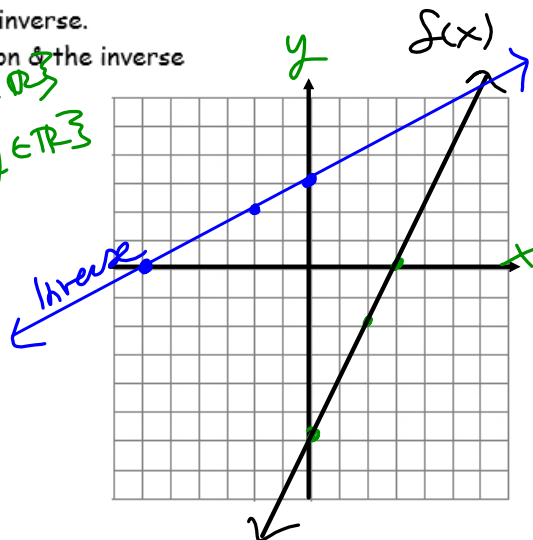   b. State the domain & range for the function & the inverse

$f(x)$

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

| X | 0 | 2 | 3 |
|---|---|---|---|
| y | -6 | -2 | 0 |

Inverse

| X | -6 | -2 | 0 |
|---|----|----|---|
| y | 0 | 2 | 3 |

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

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# QUIZ

HW tip: Remember to find the inverse graphically
by using a table of points. Then switch x & y.

Dec 3-4:30 PM