~~Do the warmup in today's Notes~~ Quiz 2 on Days 4 & 5

HW 6.6

1 - 3 see graphs next page, also state domain & range.

4. the first and last graphs both pass the vertical line test

the last graph is the only function that also passes the horizontal line tes

5. a. Sketch – see next page
b. No. The height of the ball will repeat so y-values are not unique.

6. See next page

Nov 20-7:19 PM

For each of the following functions:
a. Graph using a table of values
b. Find the inverse graphically (remember, switch x and y values)
c. Determine if the function is 1 - 1

Alg2CC HW 6.6

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

ⓐ $f(x)$

x	-2	-1	0	1	2
y	-3	-1	1	3	5

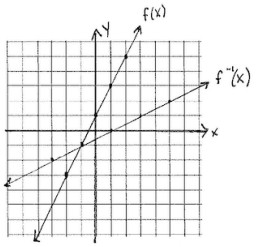
$D: \{x \mid x \in \mathbb{R}\}$
$R: \{y \mid y \in \mathbb{R}\}$

ⓑ $f^{-1}(x)$

x	-3	-1	1	3	5
y	-2	-1	0	1	2

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

ⓒ yes



2. $y = -x^2 + 3, x \geq 0$

ⓐ $f(x)$:

x	0	1	2	3	4
y	3	2	-1	-6	-13

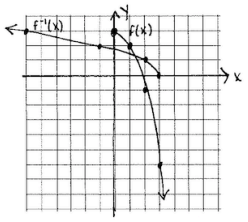
$D: \{x \mid x \geq 0\}$ $R: \{y \mid y \leq 3\}$

ⓑ $f^{-1}(x)$

x	3	2	-1	-6	-13
y	0	1	2	3	4

$D: \{x \mid x \leq 3\}$
$R: \{y \mid y \geq 0\}$

ⓒ yes



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

ⓐ $f(x)$

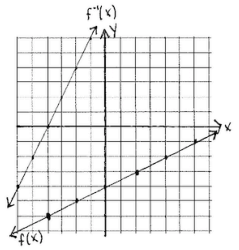
x	-4	-2	0	2	4
y	-6	-5	-4	-3	-2

ⓑ $f^{-1}(x)$

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

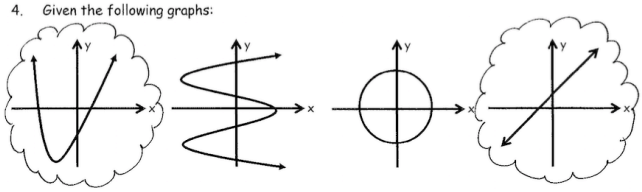
for both $D: \{x \mid x \in \mathbb{R}\}$
$R: \{y \mid y \in \mathbb{R}\}$

ⓒ yes



Jan 11-8:56 PM

4. Given the following graphs:



Circle the two graphs above that are functions. Explain how you know they are functions.

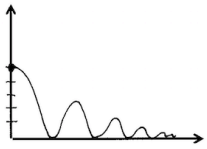
the first and last graphs both pass the vertical line test

Of the two graphs you circled, which is one-to-one? Explain how you can tell from its graph.

the last graph is the only function that also passes the horizontal line test.

5. Physics students drop a basketball from 5 feet above the ground and its height is measured each tenth of a second until it stops bouncing. The height of the basketball, h, is a function of time, t, since it was released.

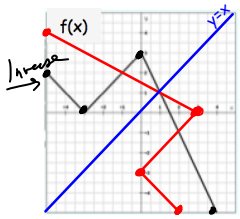
a. Sketch what you think this function would look like.



b. Is the height of the ball a 1 - 1 function? Explain your answer.

No. the height of the ball will repeat so y-values are not unique

6. A function is graphed at the left. Sketch it's inverse on the same graph.



f(x)

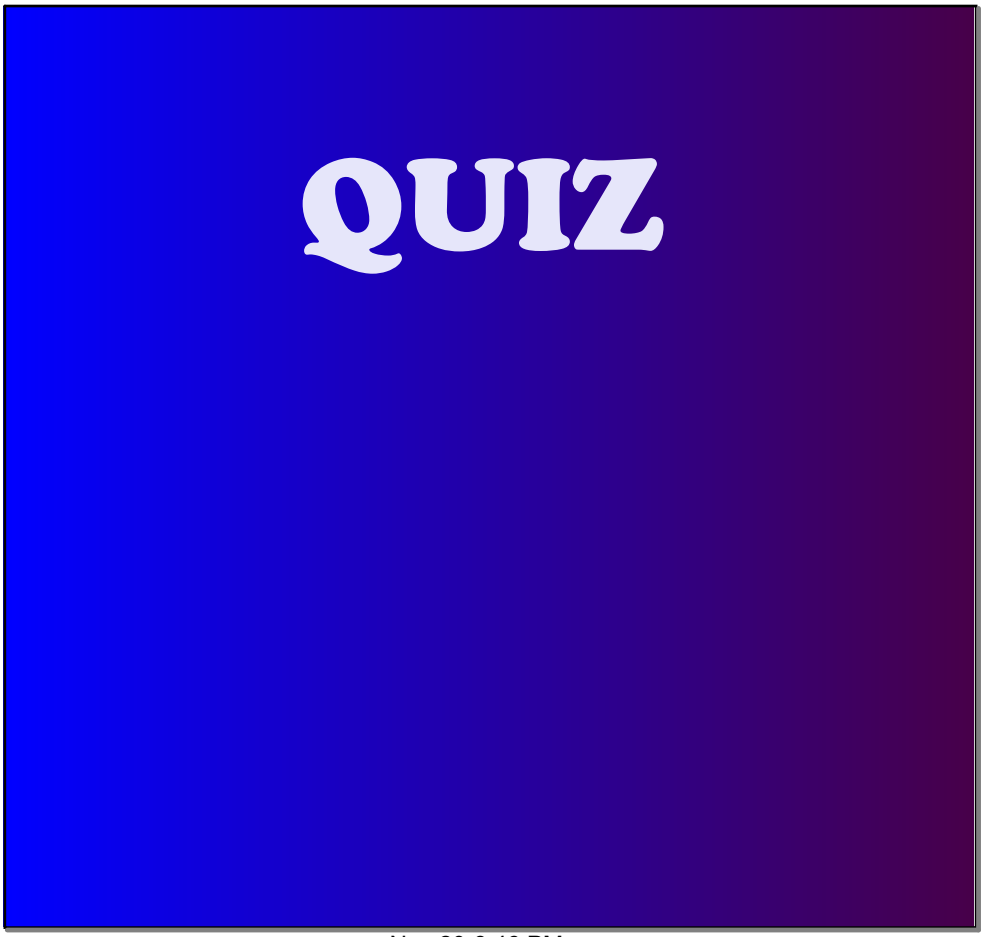
x	y
-5	4
3	0
0	-3
2	-5

Switch x and y

Inverse

x	y
4	-5
0	3
-3	0
-5	2

Nov 20-7:29 PM



Nov 20-8:46 PM

Inverse Algebraically

Nov 20-8:46 PM

Warm-Up

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.

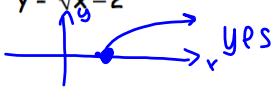
1. $y = -x^3 + 2x$

No. fails horizontal line test

2. {(2, 4), (-2, 4), (3, 9), (-3, 9)}

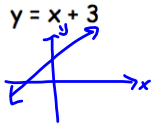
no. y-values of 4 & 9 repeat

3. $y = \sqrt{x-2}$



yes

4. $y = x + 3$



yes

Nov 20-8:50 PM

Steps for finding the inverse of a function algebraically:

$\frac{1}{x} \rightarrow x \neq 0$

$\sqrt{x} \rightarrow x \geq 0$

$\frac{1}{\sqrt{x}} \rightarrow x > 0$

1. Find the domain and range of f(x)
2. Change f(x) to y
3. Switch x and y
4. Solve for y
5. Replace ~~f(x)~~ y with $f^{-1}(x)$ - if $f^{-1}(x)$ is a function
6. Switch domain and range

Finding domain and range of the original function is important because the domain and range of f(x) define the domain and range for the inverse function (relation).

Nov 20-8:51 PM

Find the inverse of the following functions:

1. $f(x) = \sqrt{x+3}$

① $x+3 \geq 0 \rightarrow x \geq -3$ D: $\{x \mid x \geq -3\}$ R: $\{y \mid y \geq 0\}$

② $y = \sqrt{x+3}$

③ $x = \sqrt{y+3}$

④ $x^2 = (\sqrt{y+3})^2$

$x^2 = y+3$

$y = x^2 - 3$

⑤ $f^{-1}(x) = x^2 - 3$

⑥ $f^{-1}(x)$: $\{x \mid x \geq 0\}$, $\{y \mid y \geq -3\}$

2. $f(x) = x^2 - 3$

① D: $\{x \mid x \in \mathbb{R}\}$ R: $\{y \mid y \geq -3\}$

② $y = x^2 - 3$

③ $x = y^2 - 3$

④ $\pm\sqrt{x+3} = \sqrt{y^2}$

$y = \pm\sqrt{x+3}$

$y_1 = \sqrt{x+3}$, $y_2 = -\sqrt{x+3}$

⑤ Inverse is not a function. $f(x)$ was not 1-1.

⑥ D: $\{x \mid x \geq -3\}$ R: $\{y \mid y \in \mathbb{R}\}$

Nov 20-8:51 PM

3. $f(x) = \frac{3}{5}x + 2$

① linear $\{x \mid x \in \mathbb{R}\}$ $\{y \mid y \in \mathbb{R}\}$

② $y = \frac{3}{5}x + 2$

③ $x = \frac{3}{5}y + 2$

④ $\frac{5}{3}(x-2) = \left(\frac{3}{5}y\right)\frac{5}{3}$

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

$y = \frac{5x-10}{3}$

⑤ $f^{-1}(x) = \frac{5x-10}{3}$

⑥ D: $\{x \mid x \in \mathbb{R}\}$
R: $\{y \mid y \in \mathbb{R}\}$

To check on your graphing calculator
- $Y_1 = f(x)$
- $Y_2 = f^{-1}(x)$
- Go to home screen
- 2nd PRGM (DRAW)
- 8:DrawInv
- VARS → Y-VARS → 1:Function → Y_1 enter
- Inverse should trace over Y_2

Nov 20-8:52 PM

4. $f(x) = \sqrt[3]{x+2}$

① D: $\{x \mid x \in \mathbb{R}\}$
R: $\{y \mid y \in \mathbb{R}\}$

② $y = \sqrt[3]{x+2}$

③ $(x)^3 = (\sqrt[3]{y+2})^3$

④ $x^3 = y + 2$

$y = x^3 - 2$

⑤ $f^{-1}(x) = x^3 - 2$

⑥ D: $\{x \mid x \in \mathbb{R}\}$
R: $\{y \mid y \in \mathbb{R}\}$

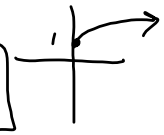
5. $f(x) = \sqrt{x} + 1$

Nov 20-8:52 PM

4. $f(x)=\sqrt[3]{x+2}$

5. $f(x)=\sqrt{x}+1$

(1) $D:\{x \mid x \geq 0\}$
$R:\{y \mid y \geq 1\}$



(2) $y=\sqrt{x}+1$

(3) $x=\sqrt{y}+1$

(4) $(x-1)^2=(\sqrt{y})^2$

$y=(x-1)(x-1)$

$y=x^2-2x+1$

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

(6) $D:\{x \mid x \geq 1\}$
$R:\{y \mid y \geq 0\}$

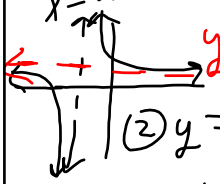
Nov 20-8:52 PM

6. $f(x)=\frac{x+4}{x+2}$

(1) $x+2 \neq 0$
$x \neq -2$
$D:\{x \mid x \neq -2\}$
$R:\{y \mid y \neq 1\}$

$x=-2$

$y=1$



(2) $y=\frac{x+4}{x+2}$

(3) $x=\frac{y+4}{y+2}$

(4) $x(y+2)=y+4$

$xy+2x=y+4$
$-y \quad -2x \quad -y \quad -2x$

(*) $xy-y=4-2x$

$y(x-1)=4-2x$

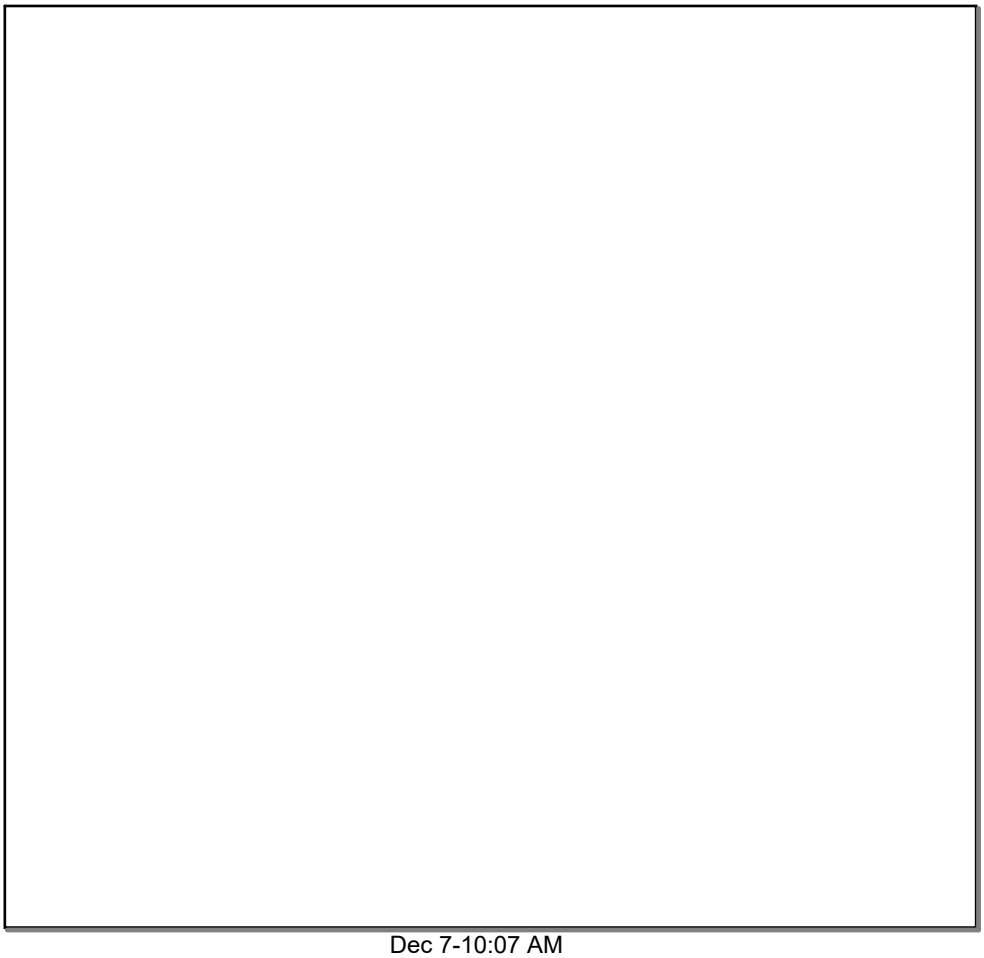
$y=\frac{4-2x}{x-1}$

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

7. $f(x)=\frac{2x+1}{3-x}$

(6) $D:\{x \mid x \neq 1\}$
$R:\{y \mid y \neq -2\}$

Nov 20-8:53 PM



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