MCR 3UI

UNIT 3: Review for Quiz

1. Circle the number of the transformation in function notation (see below) that matches the description of the transformations (a) – (e).

a) $f(x)$ translated right 3	1	2	(3)	4	5	6	7	8
b) $f(x)$ translated up 3	1	2	3	4	(5)	6	7	8
c) $f(x)$ translated down 3 and right 2	1	2	3	4	5	(6)	7	8
d) $f(x)$ translated down 3 and ~~right~~ left 2	1	2	3	4	5	6	(7)	8
e) $f(x)$ reflected in the y-axis	(1)	2	3	4	5	6	7	8
f) $f(x)$ reflected in the x-axis	1	(2)	3	4	5	6	7	8

1. $y = f(-x)$ 2. $y = -f(x)$ 3. $y = f(x-3)$ 4. $y = f(x+3)$
5. $y = f(x)+3$ 6. $y = f(x-2)-3$ 7. $y = f(x+2)-3$ 8. $y = f(x-3)-2$

2. State whether each relation below represents a function. Explain your reasoning. (Vertical line test is ONLY a valid reason if you provide a graph) Also, determine the domain and range for each relation.

a) $\{(1, 2), (2, 3), (2, -1), (4, -1)\}$

- ☐ Is a function
- ☑ Is not a function

Reasoning: Two points have the same x-value with different y-values.

$D = \{1, 2, 4\}$
$R = \{-1, 2, 3\}$

b) $y = x$

- ☑ Is a function
- ☐ Is not a function

Reasoning: A line with slope 1 is a function.

$D = \{x \in \mathbb{R}\}$
$R = \{y \in \mathbb{R}\}$

c) $x = -5$

- ☐ Is a function
- ☑ Is not a function

Reasoning: A vertical line is not a function

$D = \{5\}$
$R = \{y \in \mathbb{R}\}$.

d) $y = 7$

- ☑ Is a function
- ☐ Is not a function

Reasoning: A horizontal line is a function.

$D = \{x \in \mathbb{R}\}$
$R = \{7\}$

d) $x^2 + y^2 = 49$

- ☐ Is a function
- ☑ Is not a function

Reasoning: There are points where the same y-value has more than 1 x-value.

$D = \{x \in \mathbb{R} \mid -7 \le x \le 7\}$ $R = \{y \in \mathbb{R} \mid -7 \le y \le 7\}$

e) $y = (x+3)^2 + 4$

- ☑ Is a function
- ☐ Is not a function

Reasoning: A quadratic is a function.

$D = \{x \in \mathbb{R}\}$
$R = \{y \in \mathbb{R} \mid y \ge 4\}$

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

- ☑ Is a function
- ☐ Is not a function

Reasoning: A root function is a function.

$D = \{x \in \mathbb{R} \mid x \ge -1\}$
$R = \{y \in \mathbb{R} \mid y \ge 0\}$.

3. Given $f(x) = 5 - 4x$, find

a) f(2)

$f(2) = 5 - 4(2)$
$= 5 - 8$
$= -3$

b) -f(3)

$-f(3) = -(5 - 4(3))$
$= -(5 - 12)$
$= -(-7)$
$= 7$

c) x when f(x) = 10

$5 - 4x = 10$
$-4x = 5$
$x = \frac{-5}{4}$

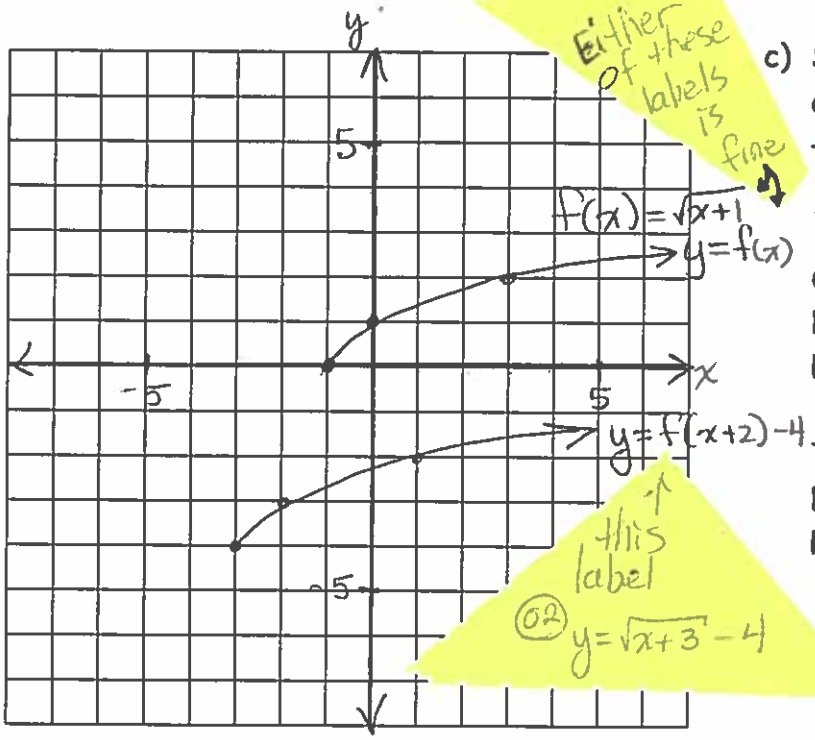
4. Let $f(x)=\sqrt{x+1}$ $\sqrt{x}$ left 1

a) Determine the new image **equation** if $y = f(x+2)-4$. left 2 down 4

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

$y=\sqrt{x+3}-4$

b) Sketch a graph of $f(x)=\sqrt{x+1}$ and $y = f(x+2)-4$ on the same grid. Label each curve.



Either of these labels is fine

this label (0,2) $y=\sqrt{x+3}-4$

c) State the domain and range of the original image, $f(x)=\sqrt{x+1}$ and the transformed image, $y = f(x+2)-4$.

Original Image

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

R: $\{y\in\mathbb{R} \mid y\geq 0\}$

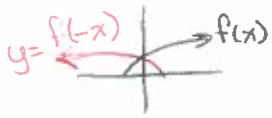
Transformed Image

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

R: $\{y\in\mathbb{R} \mid y\geq -4\}$

d) If the original image, $f(x)=\sqrt{x+1}$ was transformed to $y = f(-x)$ state its new domain and range. multiply old domain by -1

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



flip the sign when you multiply by a negative

R: $\{y\in\mathbb{R} \mid y\geq 0\}$

range same as f(x).

OR reflect in y-axis and visually observe new domain.

5. If $f(x)=\frac{1}{x-2}+5$, state the domain, range and the equations of the asymptotes.

Vertical Asymptote: $x=2$

Horizontal Asymptote: $y=5$

D: $\{x\in\mathbb{R} \mid x\neq 2\}$

R: $\{y\in\mathbb{R} \mid y\neq 5\}$

note: this is $y=\frac{1}{x}$ shifted right 2, up 5

V.A. $x=0$ ← right 2

H.A. $y=0$ ← up 5

so asymptotes, domain, range are shifted right 2, up 5

$D=\{x\in\mathbb{R} \mid x\neq 0\}$ ← right 2

$R=\{y\in\mathbb{R} \mid y\neq 0\}$ ← up 5