Assignment

1. In each case,

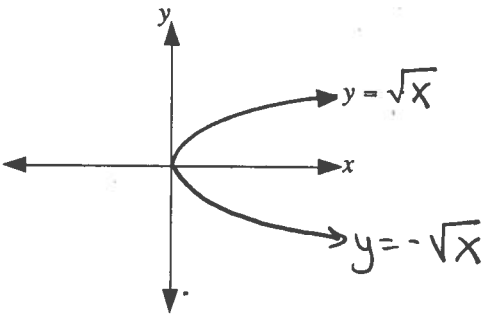
- **i)** describe the transformation(s) required to transform the graph of $y = \sqrt{x}$ to the graph of the given function
- **ii)** make a rough sketch of the graph on the grid provided
- **iii)** state the domain and range of the function
- **iv)** verify using the features of a graphing calculator

a) $y = -\sqrt{x}$

- reflection in x-axis

$x \mid x \geq 0, x \in R$

$y \mid y \leq 0, y \in R$.

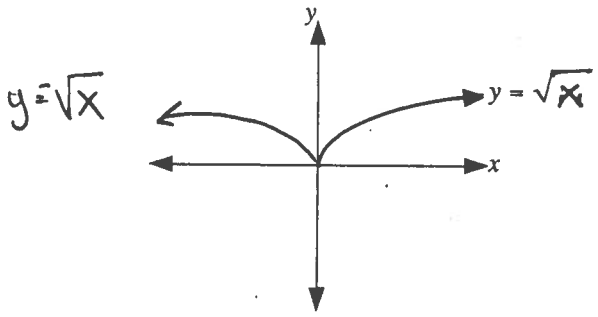


b) $y = \sqrt{-x}$

reflection in y-axis

$x \mid x \leq 0, x \in R$

$y \mid y \geq 0, y \in R$

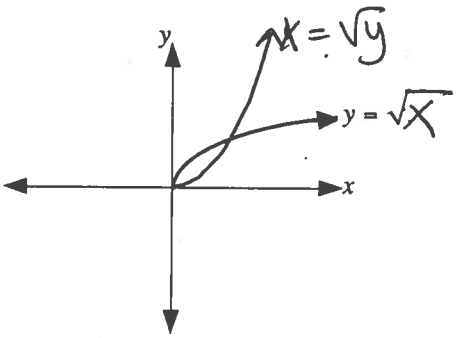


c) $x = \sqrt{y}$ $\quad x \to y$, $y \to x$

reflection in line $y = x$

$x \mid x \geq 0, x \in R$

$y \mid y \geq 0, y \in R$



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

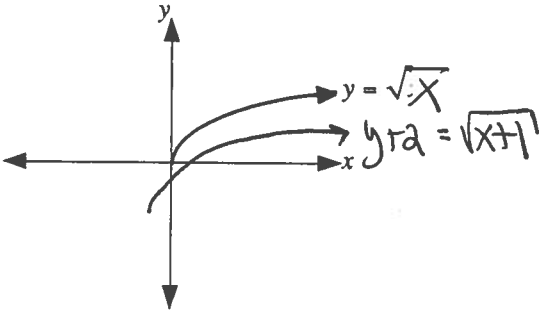
$x \to x+1$

$y \to x+2$

translation 1 U left and 2 Us down

$x \mid x \geq -1, x \in R$

$y \mid y \geq -2, y \in R$

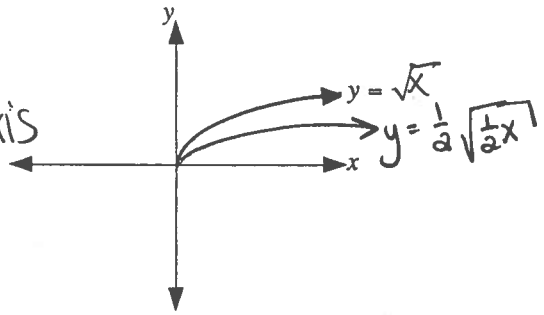


2. In each case,

- **i)** describe the series of transformations required to transform the graph of $y = \sqrt{x}$ to the graph of the given function
- **ii)** make a rough sketch of the graph on the grid provided
- **iii)** state the domain and range of the function
- **iv)** verify using the features of a graphing calculator

a) $y = \frac{1}{2}\sqrt{\frac{1}{2}x}$ $\quad y \to 2y$, $x \to \frac{1}{2}x$

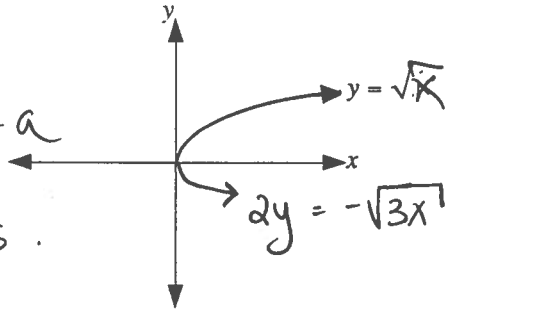
V.S. by factor of $\frac{1}{2}$ about x-axis
h.S. by factor of 2 about y-axis
$x|x \geq 0, x \in R$, $y|y \geq 0, y \in R$.



b) $2y = -\sqrt{3x}$

$y \to -2y$, $x \to 3x$

V.S. by factor of $\frac{1}{2}$ about x-axis + a reflection in x-axis
h.S. by factor of $\frac{1}{3}$ about y-axis.
$x|x \geq 0, x \in R$ $\quad y|y \leq 0, y \in R$.

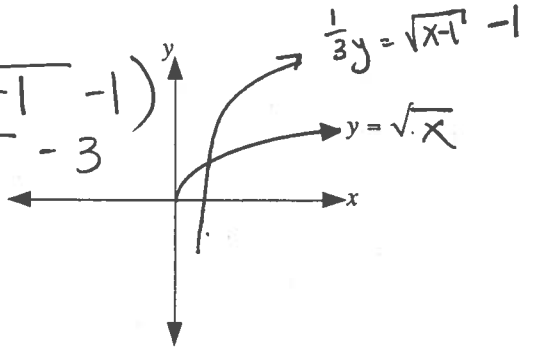


c) $\frac{1}{3}y = \sqrt{x-1} - 1$

$y \to \frac{1}{3}y$, $y \to y+1$ $\quad x \to x-1$ $\quad y = 3(\sqrt{x-1} - 1)$
$y = 3\sqrt{x-1} - 3$

- V.S. by factor of 3
- translation 1 U. right and 3 U down

$x|x \geq 1, x \in R$ $\quad y|y \geq -3, y \in R$

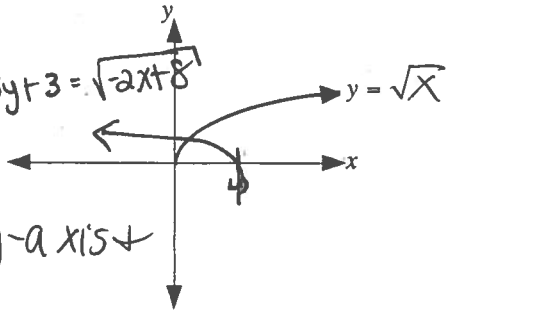


d) $3y + 3 = \sqrt{-2x + 8}$

$3(y+1) = \sqrt{-2(x-4)}$

$y \to 3y$, $x \to -2x$, $y \to y+1$, $x \to x-4$

- V.S by factor of $\frac{1}{3}$ about x-axis
- h.S. by factor of $\frac{1}{2}$ about y-axis + reflection in y-axis
- translation 4 U right + 1 U down.



3. Determine the domain and range of the function $y - k = a\sqrt{b(x-h)}$ if

a) $a>0, b>0$

$x \mid x \geq h, x \in R$

$y \mid y \geq k, x \in R$

b) $a>0, b<0$

$x \mid x \leq h, x \in R$

$y \mid y \geq k, y \in R$

c) $a<0, b>0$

$x \mid x \geq h, x \in R$

$y \mid y \leq k, y \in R$

d) $a<0, b<0$

$x \mid x \leq h, x \in R$

$y \mid y \leq k, y \in R$.

Multiple Choice **4.** The domain and range of the function $y = -\sqrt{-x}$ are, respectively, all real numbers such that

$-x \geq 0$

$x \leq 0$

A. $x \geq 0, y \geq 0$

B. $x \geq 0, y \leq 0$

C. $x \leq 0, y \geq 0$

D. $x \leq 0, y \leq 0$

Numerical Response **5.** The domain of the function $y = \sqrt{4x-3} + 2$ is $x \geq k$. The value of k, to the nearest hundredth, is _____ .

(Record your answer in the numerical response box from left to right.)

0	.	7	5

$4x - 3 \geq 0$

$4x \geq 3$

$x \geq \frac{3}{4}$ or $y = \sqrt{4\left(x - \frac{3}{4}\right)}$

→ h. trans 0.75 U. Right.

Answer Key

1. All graphs can be verified using a graphing calculator.

a) **i)** reflection in the x-axis — **iii)** $\{x \mid x \geq 0, x \in R\}$, $\{y \mid y \leq 0, y \in R\}$

b) **i)** reflection in the y-axis — **iii)** $\{x \mid x \leq 0, x \in R\}$, $\{y \mid y \geq 0, y \in R\}$

c) **i)** reflection in the line $y = x$ — **iii)** $\{x \mid x \geq 0, x \in R\}$, $\{y \mid y \geq 0, y \in R\}$

d) **i)** translation 1 unit left and 2 units down — **iii)** $\{x \mid x \geq -1, x \in R\}$, $\{y \mid y \geq -2, y \in R\}$

2. All graphs can be verified using a graphing calculator.

a) **i)** vertical stretch by a factor of $\frac{1}{2}$ about the x-axis, horiz. stretch by a factor of 2 about the y-axis

iii) $\{x \mid x \geq 0, x \in R\}$, $\{y \mid y \geq 0, y \in R\}$

b) **i)** vertical stretch by a factor of $\frac{1}{2}$ about the x-axis, horiz. stretch by a factor of $\frac{1}{3}$ about the y-axis then a reflection in the x-axis — **iii)** $\{x \mid x \geq 0, x \in R\}$, $\{y \mid y \leq 0, y \in R\}$

c) **i)** vertical stretch by a factor of 3 about the x-axis, then a translation 1 unit right and 3 units down — **iii)** $\{x \mid x \geq 1, x \in R\}$, $\{y \mid y \geq -3, y \in R\}$

d) **i)** vertical stretch by a factor of $\frac{1}{3}$ about the x-axis, horiz. stretch by a factor of $\frac{1}{2}$ about the y-axis then a reflection in the y-axis, then a translation 4 units right and 1 unit down

ii) $\{x \mid x \leq 4, x \in R\}$, $\{y \mid y \geq -1, y \in R\}$

3. **a)** $\{x \mid x \geq h, x \in R\}$, $\{y \mid y \geq k, y \in R\}$ **b)** $\{x \mid x \leq h, x \in R\}$, $\{y \mid y \geq k, y \in R\}$

c) $\{x \mid x \geq h, x \in R\}$, $\{y \mid y \leq k, y \in R\}$ **d)** $\{x \mid x \leq h, x \in R\}$, $\{y \mid y \leq k, y \in R\}$

4. D **5.**

0	.	7	5