Transformations Review

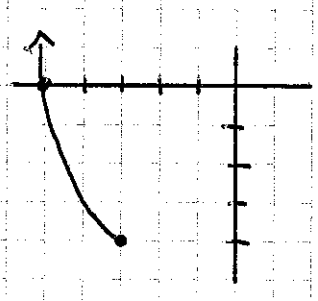
① $y = f(x)$ → $y = 3f\left(\frac{1}{4}x\right)$

(x, y) → $(4x, 3y)$

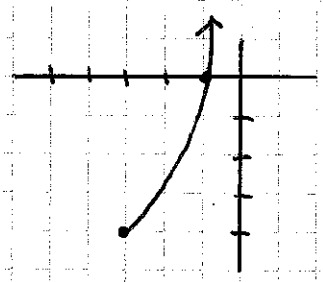
$(2, 3)$ → $\boxed{(8, 9)}$

② Divide the graph in half at its axis of symmetry. $x = -3$

Option 1 $x \leq -3$

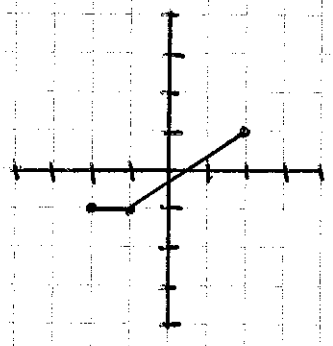


Option 2 $x \geq -3$



③ $y = f(-x)$ is a reflection in the y-axis so for every point (x, y) on $f(x)$ there will be a point $(-x, y)$ on $f(-x)$. Since the y-coord. is unaffected, the range is unaffected.

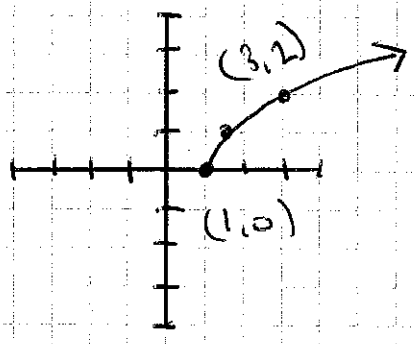
④ reflect in x-axis



⑤ $y = \sqrt{2x-2}$

$y = \sqrt{2(x-1)}$ is $y = \sqrt{x}$ H.C. by $\frac{1}{2}$ and right 1

$y = \sqrt{x}$	$y = \sqrt{2(x-1)}$
(0, 0)	(1, 0)
(1, 1)	(1.5, 1)
(4, 2)	(3, 2)



⑥ $y = 2x - 6$

$x = 2y - 6$ switch x and y

$2y = x + 6$ isolate y

$y = \frac{x}{2} + 3$

⑦ $y = f(x-3) + 5$ is $y = f(x)$ translated right 3 and up 5.

⑧ $y = f(2x-6)$ or $y = f(2(x-3))$ is the graph of $y = f(x)$ horizontally compressed by $\frac{1}{2}$ then translated right 3.

⑨ reflecting in $y = x$ means the x and y coord of each point switch.

$\therefore f^{-1}(x) = \{(4,-3), (7,2), (6,8)\}$

D: $\{4, 7, 6\}$

(10) $y = f(x)$ → $y = 2f(x+1)$

(x, y) → $(x-1, 2y)$

$(3, -2)$ → $\boxed{(2, -4)}$

(11) $y = 4 - x$

$x = 4 - y$

$x - 4 = -y$

$y = -(x - 4)$

$y = 4 - x$

So $f^{-1}(x) = 4 - x$ ∴ $f^{-1}(x) = f(x)$

(12) $y = \sqrt{x+1} - 2$ is $y = \sqrt{x}$ translated left 1 and down 2

$y = \sqrt{x}$

$(0, 0)$

$(1, 1)$

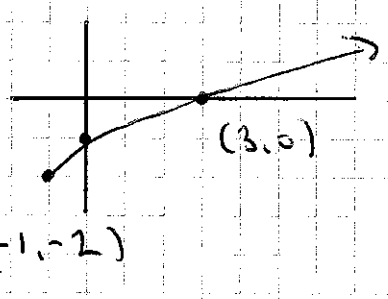
$(4, 2)$

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

$(-1, -2)$

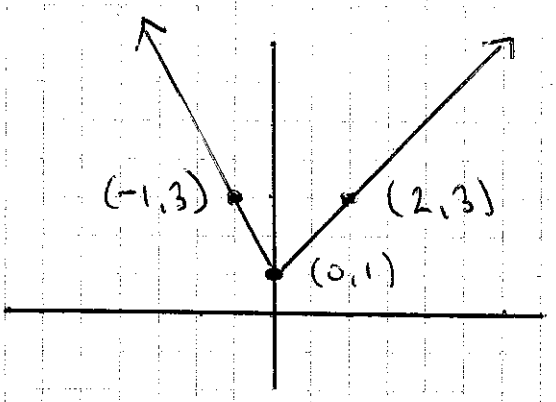
$(0, -1)$

$(3, 0)$



(13) First multiply the y-values by 2, then move the graph up 5

(14)



$g(x) = f(x-2) + 3$

right 2

up 3

(15) $2f(2x)$ means $(x,y) \longrightarrow \left(\frac{1}{2}x, 2y\right)$

$\therefore \quad (4,-3) \longrightarrow \boxed{(2,-6)}$

(16) since x and y are switched, this is an inverse relation, or a reflection in the line $y = x$.

(17) $y = (x+1)^2 \qquad x \leq -1$

$x = (y+1)^2$ switch x and y

$\pm\sqrt{x} = y+1$ isolate y

$y = \pm\sqrt{x} - 1 \qquad y \leq -1$ (Domain of f becomes range of f^{-1})

$\therefore \quad y = -\sqrt{x} - 1$

$f^{-1}(x) = -\sqrt{x} - 1$

(18) Split the graph at its axis of symmetry $x = 1$.

Option 1 $\quad x \leq 1$

Option 2 $\quad x \geq 1$

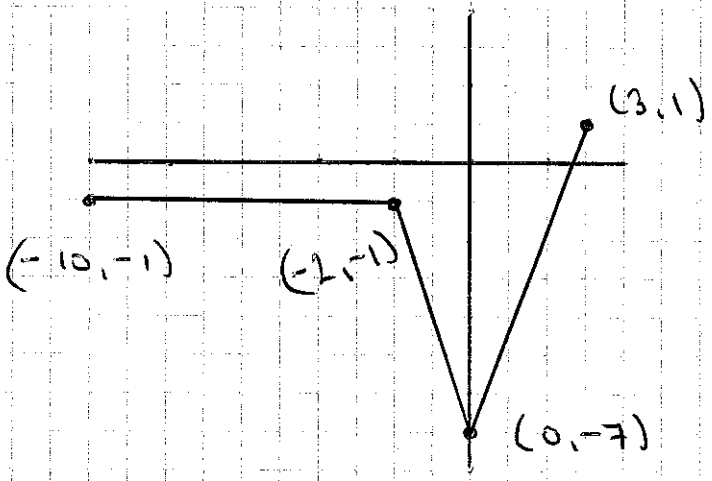
(19) reflection in x, so $y = -f(x)$

$y = -f(x)$

$= -(x^2+4)$

$y = -x^2 - 4$

(20) V.S by 2 then down 3



(21) 3 units right $\rightarrow$ $y = f(x-3)$

$\therefore$ $y = x^2 - x + 2$

$= (x-3)^2 - (x-3) + 2$

$= x^2 - 6x + 9 - x + 3 + 2$

$\boxed{y = x^2 - 7x + 14}$

(22) $y = \sqrt{x}$ has a domain $x \geq 0$

$y = \sqrt{-4x}$ is a H.C. by $-\frac{1}{4}$, so multiply x-coord by $-\frac{1}{4}$. Do the same to the domain.

So $y = \sqrt{-4x}$ has domain $x \geq 0$

(23)

$f(x)$		$f(-x)$
(x, y)		$(-x, y)$
$(-3, 5)$	$\longrightarrow$	$\boxed{(3, 5)}$

(24) $y = -\sqrt{3(x+1)}$ is $y = \sqrt{x}$ H.C. by $\frac{1}{3}$, reflected in x-axis, then moved left 1

$y = \sqrt{x}$	$y = -\sqrt{3(x+1)}$
(x, y)	$(\frac{1}{3}x - 1, -y)$
$(0, 0)$	$(-1, 0)$
$(4, 2)$	$(\frac{1}{3}, -2)$
$(9, 3)$	$(2, -3)$