

Solve each equation by hand and check for extraneous solutions.

1)  $4\sqrt{y} - 6 = 18$   
 $+6 \quad +6$

$4\sqrt{y} = 24$   
 $\frac{4\sqrt{y}}{4} = \frac{24}{4}$   
 $(\sqrt{y}) = (6)$   
 $(\sqrt{y})^2 = (6)^2$   
 $y = 36$  ✓

Check:  
 $4\sqrt{36} - 6 = 18$   
 $4(6) - 6 = 18$   
 $18 = 18$

2)  $\sqrt{3x} + 2 = 5$   
 $-2 \quad -2$

$(\sqrt{3x})^2 = (3)^2$   
 $3x = 9$   
 $\frac{3x}{3} = \frac{9}{3}$   
 $x = 3$  ✓

Check:  
 $\sqrt{3(3)} + 2 = 5$   
 $3 + 2 = 5$   
 $5 = 5$

3)  $3\sqrt{x-7} + 5 = 20$   
 $-5 \quad -5$

$3\sqrt{x-7} = 15$   
 $\frac{3\sqrt{x-7}}{3} = \frac{15}{3}$   
 $(\sqrt{x-7}) = (5)$   
 $x-7 = 25$   
 $+7 \quad +7$   
 $x = 32$  ✓

Check:  
 $3\sqrt{32-7} + 5 = 20$   
 $3\sqrt{25} + 5 = 20$   
 $15 + 5 = 20$   
 $20 = 20$  ✓

4)  $\sqrt{2x} + 4 = 8$   
 $-4 \quad -4$

$(\sqrt{2x})^2 = (4)^2$   
 $2x = 16$   
 $\frac{2x}{2} = \frac{16}{2}$   
 $x = 8$  ✓

Check:  
 $\sqrt{2(8)} + 4 = 8$   
 $\sqrt{16} + 4 = 8$   
 $4 + 4 = 8$   
 $8 = 8$

5)  $3\sqrt{x} + 8 = 12$   
 $-8 \quad -8$

$3\sqrt{x} = 4$   
 $\frac{3\sqrt{x}}{3} = \frac{4}{3}$   
 $(\sqrt{x}) = (\frac{4}{3})$   
 $x = \frac{16}{9}$  ✓

Check:  
 $3\sqrt{\frac{16}{9}} + 8 = 12$   
 $3(\frac{4}{3}) + 8 = 12$   
 $4 + 8 = 12$   
 $12 = 12$

6)  $7 + \sqrt{1-5x} = 16$   
 $-7 \quad -7$

$(\sqrt{1-5x})^2 = (9)^2$   
 $1-5x = 81$   
 $-1 \quad -1$   
 $-5x = 80$   
 $\frac{-5x}{-5} = \frac{80}{-5}$   
 $x = -16$  ✓

Check:  
 $7 + \sqrt{1-5(-16)} = 16$   
 $7 + \sqrt{81} = 16$   
 $7 + 9 = 16$   
 $16 = 16$

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

$2x+1 = 3-4x$   
 $+4x \quad +4x$   
 $6x+1 = 3$   
 $-1 \quad -1$   
 $6x = 2$   
 $\frac{6x}{6} = \frac{2}{6}$   
 $x = \frac{1}{3}$

Check:

$\sqrt{2(\frac{1}{3})+1} = \sqrt{3-4(\frac{1}{3})}$   
 $\sqrt{\frac{2}{3}+1} = \sqrt{3-\frac{4}{3}}$   
 $\sqrt{\frac{5}{3}} = \sqrt{\frac{5}{3}}$  ✓

8)  $(x-5)^2 = (\sqrt{-6x+46})^2$

$(x-5)(x-5) = -6x+46$   
 $x^2 - 10x + 25 = -6x + 46$   
 $+6x \quad -46 \quad +6x \quad -46$   
 $x^2 - 4x - 21 = 0$   
 $(x-7)(x+3) = 0$   
 $x = 7$  ✓  $x = -3 \rightarrow$  extraneous

Check:

$7-5 = \sqrt{-6(7)+46}$   
 $2 = \sqrt{4}$   
 $2 = 2$  ✓  
 $-3-5 = \sqrt{-6(-3)+46}$   
 $-8 = \sqrt{64}$   
 $-8 \neq 8$

Write an equation for a radical function with the following transformations:

8. ~~flipped~~, reflected, shifted right 4 and down 2

$y = -\sqrt{x-4} - 2$

10. Shift up 4 and ~~flipped~~ reflected over x-axis

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

12. Shift down 3, shift right 4

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

9. shifted up 3, and shifted left 1

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

11. Shift left 2 and ~~flipped~~ reflected over x-axis.

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

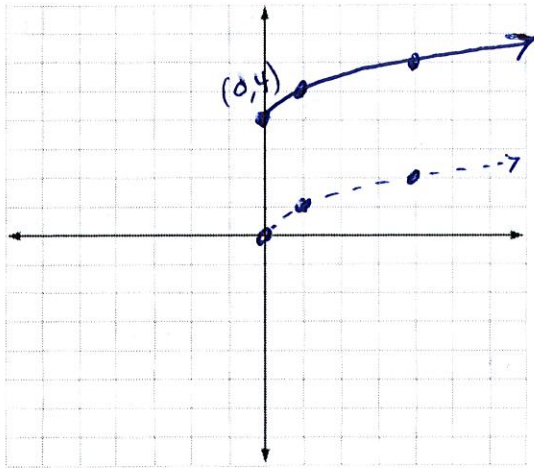
13. Shift right 3, shift up 1

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

Identify the transformations. Sketch. Give the Domain and Range. Give the x-intercept and y-intercept.

14.)  $f(x) = \sqrt{x} + 4$

$y = \sqrt{x}$



x	y
0	0
1	1
4	2

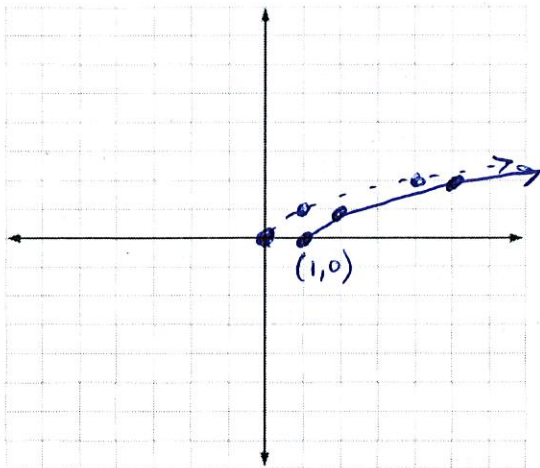
transformations: shift up 4

domain:  $[0, \infty)$  range:  $[4, \infty)$

x-int: none y-int:  $(0, 4)$

No solution  
 $0 = \sqrt{x} + 4$   
 $-4 = \sqrt{x}$   
 $-4 = \sqrt{x}$   
 $x = 16$  (extran.)  
 $y = \sqrt{0} + 4$   
 $y = 0 + 4$   
 $y = 4$

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



x	y
0	0
1	1
4	2

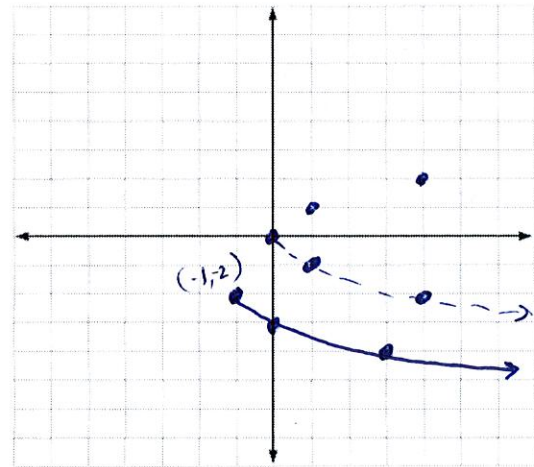
transformations: shifts right 1

domain:  $[1, \infty)$  range:  $[0, \infty)$

x-int:  $(1, 0)$  y-int: none

$(0) = (\sqrt{x-1})^2$   
 $0 = x-1$   
 $+1$     $+1$   
 $1 = x$   
 $y = \sqrt{0-1}$   
 $y = \sqrt{-1}$   
no solution

15.)  $f(x) = -\sqrt{x+1} - 2$



x	y
0	0
1	1
4	2

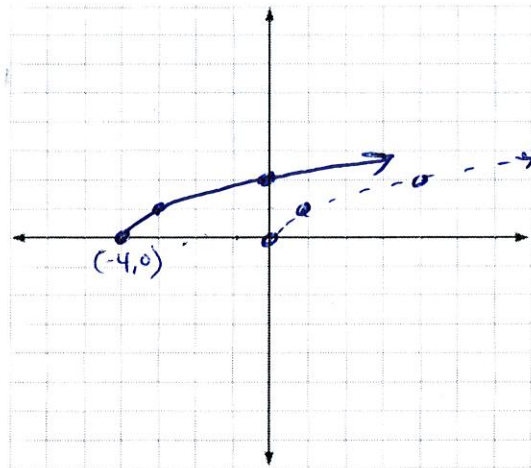
transformations: reflect over x-axis, shifts left 1 down 2

domain:  $[-1, \infty)$  range:  $(-\infty, -2]$

x-int: none y-int:  $(0, -3)$

$0 = -\sqrt{x+1} - 2$   
 $+2$     $+2$   
 $2 = -\sqrt{x+1}$     $(-2)^2 = (\sqrt{x+1})^2$   
 $-1$     $-1$     $4 = x+1$   
 $x = 3$  (extran.)  
 $y = -\sqrt{0+1} - 2$   
 $y = -\sqrt{1} - 2$   
 $y = -1 - 2$   
 $y = -3$

17.)  $f(x) = \sqrt{x+4}$



x	y
0	0
1	1
4	2

transformations: shifts left 4

domain:  $[-4, \infty)$  range:  $[0, \infty)$

x-int:  $(-4, 0)$  y-int:  $(0, 2)$

$(0) = (\sqrt{x+4})^2$   
 $0 = x+4$   
 $-4$     $-4$   
 $x = -4$   
 $y = \sqrt{0+4}$   
 $y = \sqrt{4}$   
 $y = 2$