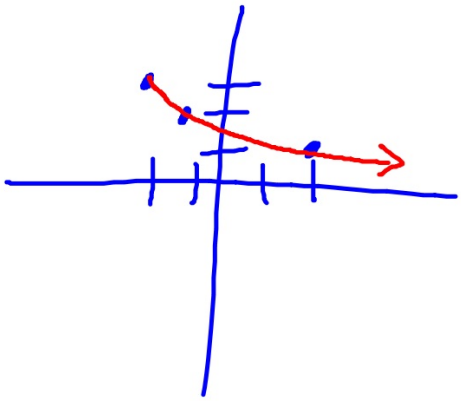
$$y = -\sqrt{x+2} + 3$$

$D: \{x \mid x \geq -2\}$

x	y
-2	3
-1	2
2	1



3.6: Solving Radical Equations

Steps

1) Isolate the radical
2) Square both sides
3) Solve for x
4) Check for extraneous solutions

1 $\sqrt{x-5}+2=7$

$(\sqrt{x-5})^2=(5)^2$

$x-5=25$

$\boxed{x=30}$

check:

$\sqrt{30-5}+2=7$

$5+2=7$ ✓

(2) $\sqrt{x+2} - 4 = -10$ $\qquad$ $\sqrt{x+2} = -6$

$$\sqrt{x+2}^{\,2} = (-6)^2$$

$$x+2 = 36$$

$$\cancel{x = 34}$$

No solution

<u>Check</u>

$$\sqrt{34+2} - 4 = -10$$

$$6 - 4 \neq -10$$

3 $\sqrt{44-2x} + 10 = x$

$$\left(\sqrt{44-2x}\right)^2 = (x-10)^2$$

$$44-2x = x^2-20x+100$$

$$0 = x^2-18x+56$$

$$0 = (x-14)(x-4)$$

$$x = \cancel{4}, 14$$

$$\boxed{x=14}$$

8.7

14.4

Check

$\cancel{x=4}$

$\sqrt{44-8}+10=4$

$16 \neq 4$

$x=14$ ✓

$\sqrt{44-28}+10=14$

$4+10=14$

4

$$1 - 2\sqrt{x^2 - 5x + 15} = -5$$

$$\sqrt{x^2 - 5x + 15}^{\,2} = 3^2$$

$$x^2 - 5x + 15 = 9$$

$$x^2 - 5x + 6 = 0$$

$$(x-2)(x-3) = 0$$

$$\boxed{x = 2, 3}$$

5 $\sqrt{x-3} = \sqrt{x+4} - 1$

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

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

$x - 3 = x + 4 - \sqrt{x+4} - \sqrt{x+4} + 1$

$x - 3 = x + 5 - 2\sqrt{x+4}$

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

$4 = \sqrt{x+4}$

$16 = x + 4$

$\boxed{x = 12}$ ✓

check

$\sqrt{12-3} = \sqrt{12+4} - 1$

$3 = 4 - 1$

Two roots

1) Isolate ONE of the radicals

2) Square both sides

3) Repeat

6

$$\sqrt{x-10} + \sqrt{x} = 1$$

$$\sqrt{x-10}^{\,2} = \left(1 - \sqrt{x}\right)^2$$

$$\cancel{x} - 10 = 1 - 2\sqrt{x} + \cancel{x}$$

$$-11 = -2\sqrt{x}$$

$$\left(\frac{11}{2}\right)^2 = \sqrt{x}^{\,2}$$

$$\frac{121}{4} = x$$

Check

$$\sqrt{\frac{121}{4} - 10} + \frac{11}{2} = 1$$

$$\sqrt{\frac{121-40}{4}} + \frac{11}{2}$$

$$\frac{9}{2} + \frac{11}{2} \neq 1$$

7

$$\sqrt[3]{2x+1} - 4 = 1$$

$$\left(\sqrt[3]{2x+1}\right)^3 = 5^3$$

$$2x+1 = 125$$

$$\boxed{x = 62}$$ ✓

8 $\sqrt[4]{3x+1} - 3 = 1$

$$\left(\sqrt[4]{3x+1}\right)^4 = 4^4$$

$$3x+1 = 256$$

$$x = \frac{255}{3}$$

$$\boxed{x = 85}$$

$$\sqrt[4]{3(85)+1}$$

$$\sqrt[4]{256} - 3 = 1$$

$$4 - 3 = 1 \checkmark$$

9

$$(5x-4)^{1/3} - 7 = -6$$

$$\left((5x-4)^{1/3}\right)^3 = 1^3$$

$$5x - 4 = 1$$

$$\boxed{x = 1}$$ ✓