

April 2, 2018

Sect. 7-6

Solving Radical Eqns.

Set up

Solve

Check (Required)

Extraneous Solns.

Solve:  $\sqrt{x} = 5$

$$\left(\sqrt{x}\right)^2 = (5)^2 \quad *$$

$$x = 5^2$$

$$x = 25 \quad \checkmark$$

\* Can give extraneous solutions.  
 You MUST check your answer(s).

Check:  $\sqrt{25} \stackrel{?}{=} 5$   
 $5 \stackrel{?}{=} 5 \quad \checkmark$

$$\begin{array}{r} \sqrt{2x} - 3 \stackrel{?}{=} 7 \\ \quad \quad \quad + 3 \quad \quad \quad + 3 \\ \hline \end{array}$$

$$\sqrt{2x} = 10$$

$$(\sqrt{2x})^2 = (10)^2$$

$$2x = 100$$

$$x = 50 \quad \checkmark$$

Check:

$$\sqrt{2(50)} - 3 \stackrel{?}{=} 7$$

$$\sqrt{100} - 3 \stackrel{?}{=} 7$$

$$10 - 3 \stackrel{?}{=} 7$$

$$7 \stackrel{?}{=} 7 \quad \checkmark$$

$$\sqrt{x} + 5 = 2$$

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

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

~~$$x = 9$$~~

No Sol.

ck:

$$\sqrt{9} + 5 \stackrel{?}{=} 2$$

$$3 + 5 \stackrel{?}{=} 2$$

~~$$8 \stackrel{?}{=} 2$$~~

$$\begin{array}{r} \sqrt[3]{x} - 4 = 1 \\ +4 \quad \vdots \quad 4 \\ \hline \end{array}$$

$$\sqrt[3]{x} = 5$$

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

$$x = 5^3$$

$$x = 125$$

ck:

No check  
needed

Cubed<sup>3</sup> both  
sides  
(odd)

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

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

$$3x-5 = x+1$$

$$\begin{array}{r} -x+5 \\ \hline \end{array}$$

$$2x = 6$$

$$x = 3 \quad \checkmark$$

Chk:

$$\sqrt{3(3)-5} \stackrel{?}{=} \sqrt{3+1}$$

$$\sqrt{9-5} \stackrel{?}{=} \sqrt{4}$$

$$\sqrt{4} \stackrel{?}{=} 2$$

$$2 \stackrel{?}{=} 2 \quad \checkmark$$

$$\left(\sqrt{x-15}\right)^2 = \left(3 - \sqrt{x}\right)^2$$

$$x - 15 = (3 - \sqrt{x})(3 - \sqrt{x})$$

$$x - 15 = 9 - 3\sqrt{x} - 3\sqrt{x} + x$$

$$x - 15 = 9 + x$$

$$\begin{array}{r} x-15 \doteq 9+x-6\sqrt{x} \\ \hline -x-9 \quad \quad \quad -9-x \end{array}$$

$$-24 = -6\sqrt{x}$$

$$(\sqrt{x})^2 = (4)^2$$

$$x = \cancel{16} \Rightarrow \text{No Sol}$$

Chk:

$$\sqrt{16-15} \stackrel{?}{=} 3-\sqrt{16}$$

$$\sqrt{1} \stackrel{?}{=} 3-4$$

$$1 = -1 \quad \times$$



$$(6x)^2 = (\sqrt{24 + 12x})^2$$

$$36x^2 = 24 + 12x$$

$$-24 \quad -12x$$

$$\frac{36x^2 - 12x - 24}{12} = \frac{0}{12}$$

$$3x^2 - x - 2 = 0$$

$$3x^2 - x - 2 = 0$$

$$(3x + 2)(x - 1) = 0$$

$$3x + 2 = 0 \quad \text{or} \quad x - 1 = 0$$

$$~~x = -\frac{2}{3}~~$$

$$x = 1 \quad \checkmark$$

$$Ck: x = -\frac{2}{3}$$

$$6\left(-\frac{2}{3}\right) \stackrel{?}{=} \sqrt{24 + 12\left(-\frac{2}{3}\right)}$$

$$-4 \stackrel{?}{=} \sqrt{24 - 8}$$

$$-4 \stackrel{?}{=} \sqrt{16}$$

$$-4 \stackrel{?}{=} 4 \quad \times$$

$$x = 1$$

$$6(1) \stackrel{?}{=} \sqrt{24 + 12(1)}$$

$$6 \stackrel{?}{=} \sqrt{24 + 12}$$

$$6 \stackrel{?}{=} \sqrt{36}$$

$$6 \stackrel{?}{=} 6 \quad \checkmark$$

$$\begin{array}{l}
 (x-3)^{\frac{1}{2}} + 2 = 10 \\
 \left[ (x-3)^{\frac{1}{2}} \right]^{\frac{1}{2}} = \left[ 8 \right]^{\frac{1}{2}} \\
 x - 3 = (\sqrt[3]{8})^2 \\
 x - 3 = 4 \\
 x = 7 \quad \checkmark
 \end{array}
 \quad \Bigg| \quad
 \begin{array}{l}
 \text{ck:} \\
 (7-3)^{\frac{1}{2}} + 2 \stackrel{?}{=} 10 \\
 4^{\frac{3}{2}} + 2 \stackrel{?}{=} 10 \\
 (\sqrt{4})^3 + 2 \stackrel{?}{=} 10 \\
 8 + 2 \stackrel{?}{=} 10 \\
 10 \stackrel{?}{=} 10 \quad \checkmark
 \end{array}$$

$$(x+1)^{\frac{2}{3}} = 9$$

$$\left[ (x+1)^{\frac{2}{3}} \right]^{\frac{3}{2}} = \left[ 9 \right]^{\frac{3}{2}}$$

$$x+1 = \left( \pm \sqrt[2]{9} \right)^3$$

$$x+1 = 27 \text{ or } x+1 = -27$$

$$x = 26 \text{ or } x = -28$$

Ck:

No ck  
needed

(odd power)