

7.7. Solving Radical Equations & Inequalities (Pg 453)

Extraneous soln - result does not satisfy the equation.

Ex # 1 $\sqrt{x+2} + 4 = 7$ check

$$\begin{array}{r} \sqrt{x+2} + 4 = 7 \\ -4 \quad -4 \\ \hline \sqrt{x+2} = 3 \end{array}$$

$$\begin{array}{r} (\sqrt{x+2})^2 = (3)^2 \\ x+2 = 9 \\ -2 \quad -2 \\ \hline x = 7 \end{array}$$

$$\begin{array}{r} \sqrt{7+2} + 4 = 7 \\ 3 + 4 = 7 \\ \checkmark \end{array}$$

b) $(\sqrt{x-12})^2 = (2-\sqrt{x})^2$

$$\begin{array}{r} x-12 = 4 - 4\sqrt{x} + x \\ -x \quad -x \\ \hline -12 = 4 - 4\sqrt{x} \\ -4 \quad -4 \\ \hline -16 = -4\sqrt{x} \\ \frac{-16}{-4} = \frac{-4\sqrt{x}}{-4} \\ 4 = \sqrt{x} \end{array}$$

$$\begin{array}{r} (2-\sqrt{x})^2 = 4 - 2\sqrt{x} - 2\sqrt{x} + x \\ 4 - 4\sqrt{x} + x \end{array}$$

$$\begin{array}{r} \sqrt{16-12} = 2 - \sqrt{16} \\ 2 = 2 - 4 \\ 2 \neq -2 \end{array}$$

extraneous soln

Ex # 2 $2(\sqrt[3]{6x-3}) - 4 = 0$ check

$$\begin{array}{r} 2(\sqrt[3]{6x-3}) - 4 = 0 \\ +4 \quad +4 \\ \hline 2(\sqrt[3]{6x-3}) = 4 \\ \frac{2}{2} \quad \frac{2}{2} \\ \hline (\sqrt[3]{6x-3}) = 2 \end{array}$$

$$\begin{array}{r} (\sqrt[3]{6x-3})^3 = (2)^3 \\ 6x-3 = 8 \\ +3 \quad +3 \\ \hline 6x = 11 \\ \frac{6x}{6} = \frac{11}{6} \\ x = \frac{11}{6} \end{array}$$

$$\begin{array}{r} 2(\sqrt[3]{\frac{11}{6}} - 3)^{1/3} - 4 = 0 \\ 2(8)^{1/3} - 4 = 0 \\ 4 - 4 = 0 \\ \checkmark \end{array}$$

Ex # 3 $3(\sqrt{2n+6}) - 6 = 0$

$$\begin{array}{r} 3(\sqrt{2n+6}) - 6 = 0 \\ +6 \quad +6 \\ \hline 3(\sqrt{2n+6}) = 6 \\ \frac{3}{3} \quad \frac{3}{3} \\ \hline \sqrt{2n+6} = 2 \end{array}$$

$$\begin{array}{r} (\sqrt{2n+6})^2 = (2)^2 \\ 2n+6 = 4 \\ -6 \quad -6 \\ \hline 2n = -2 \\ \frac{2n}{2} = \frac{-2}{2} \\ n = -1 \end{array}$$

$$\begin{array}{r} 3(\sqrt{2(-1)+6}) - 6 = 0 \\ 6 - 6 = 0 \end{array}$$

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(Pg 453)

Extraneous soln. - result does not satisfy the equation.

EX # 1 a) $\sqrt{x+2} + 4 = 7$

$$\frac{\sqrt{x+2} + 4 = 7}{-4 \quad -4}$$

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

$$x+2 = 9$$

$$x = 7$$

check

$$\sqrt{7+2} + 4 = 7$$

$$3 + 4 = 7$$

✓

b) $\sqrt{x-12} = (2-\sqrt{x})^2$

$$\frac{\sqrt{x-12} = 4 - 4\sqrt{x} + x}{-\sqrt{x} \quad -x}$$

$$\frac{-12 = 4 - 4\sqrt{x}}{-4 \quad -4}$$

$$\frac{-16 = -4\sqrt{x}}{-4 \quad -4}$$

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

$$16 = x$$

$$(2-\sqrt{x})(2-\sqrt{x})$$

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

$$\sqrt{16-12} = 2 - \sqrt{16}$$

$$2 = 2 - 4$$

$$2 \neq -2$$

extraneous soln

EX # 2 $2(6x-3)^{1/3} - 4 = 0$

$$\frac{2(6x-3)^{1/3} - 4 = 0}{+4 \quad +4}$$

$$\frac{2(6x-3)^{1/3} = 4}{2 \quad 2}$$

$$(6x-3)^{1/3} = 2$$

$$6x-3 = 8$$

$$\frac{6x = 11}{6 \quad 6}$$

$$x = \frac{11}{6}$$

check

$$2\left(6\left(\frac{11}{6}\right) - 3\right)^{1/3} - 4 = 0$$

$$2(8)^{1/3} - 4 = 0$$

$$4 - 4 = 0$$

✓

EX # 3)

$$\frac{3(\sqrt[4]{2n+6}) - 6 = 0}{+6 \quad +6}$$

$$\frac{3\sqrt[4]{2n+6} = 6}{3 \quad 3}$$

$$\frac{\sqrt[4]{2n+6} = 2}{-2n+6 \quad -6}$$

$$\frac{2n = 10}{2 \quad 2}$$

$$n = 5$$

$$3(\sqrt[4]{10+6}) - 6 = 0$$

$$6 - 6 = 0$$