Solving Radical Equations Part 2

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PRE-CALCULUS 11
RADICALS
SOLVING RADICAL EQUATIONS PART 2

A. Definitions

1. **radical equation:** an equation that contains at least one radical whose radicand contains a variable.

2. **extraneous root:** a solution to a radical equation that when checked does not satisfy the original equation.

B. Solving Radical Equations

Solve the following algebra equations and verify the solutions.

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

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

   $\boxed{x=4}$

check

$3+\sqrt{x}=5$

$3+\sqrt{(4)}=5$

$3+2=5$

$5=5$ ✓

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

   $2\left[\dfrac{\sqrt{x+2}}{2}=3\right]$

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

   $x+\cancel{2}=36$
   $-2 \qquad -2$

   $\boxed{x=34}$

Check

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

$\dfrac{\sqrt{(34)+2}}{2}=3$

$\dfrac{\sqrt{36}}{2}=3$

$\dfrac{6}{2}=3$

$3=3$ ✓

3. $3\sqrt{x}+4=2\sqrt{x}+1$

$-2\sqrt{x}$. $\quad -\cancel{2\sqrt{x}}$

Since the roots are like roots we can combine them.

$\sqrt{x}+\cancel{4}=1$

$\quad -4 \quad -4$

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

$x=9$ ← extraneous root

$\boxed{\text{No Solution}}$

Check

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

$3\sqrt{(9)}+4=2\sqrt{(9)}+1$

$9+4=6+1$

$13=7$ ⊗

4. $\sqrt{x-1}+\sqrt{2x+3}=0$

$-\cancel{\sqrt{2x+3}} \quad -\sqrt{2x+3}$

Since the roots are not like roots we can't combine them. Instead move the roots to opposite sides of the equation.

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

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

$x-1=\cancel{2x}+3$

$-2x \quad -\cancel{2x}$

$-x-\cancel{1}=3$

$\quad +1 \quad +1$

$\frac{-x}{-1}=\frac{4}{-1}$

$x=-4$ ← extraneous root.

$\boxed{\text{No Solution}}$

Check

$\sqrt{x-1}+\sqrt{2x+3}=0$

$\sqrt{(-4)-1}+\sqrt{2(-4)+3}=0$

$\sqrt{-5}+\sqrt{-5}=0$

unsolvable.

Assignment: Pg. 147 #7, 9, 10, 12