Algebra 2 | Monday 4-15-13 | Class Notes

Ch. 5-8 Solving Radical Equations and Inequalities

* radical equation — an equation with a variable under a radical

$\sqrt[N]{}$

* or rational exponents
  (ex) $x^{\frac{1}{N}}$

Recall $\sqrt[N]{x} \Rightarrow$ Nth root of x

N is the index of the radical. If it is missing, it is assumed to be 2 ie., a "square" root

---

Steps to solve a radical equation

1. get the radical "by itself" using GRE
2. raise both sides of equation by the power of the index to get variable out of radical.
3. * DO Checks!

* there may be false AKA extraneous solutions

You may not be able to get the radical by itself — undo it but be careful to undo it correctly.

(Ex) $2\sqrt{x+1} = 14$

$\sqrt{x+1} = 7$

$x+1 = 49$

$\boxed{x = 48}$

Ck $2\sqrt{48+1} \stackrel{?}{=} 14$

$2(7) \stackrel{?}{=} 14$ ✓

(Ex) $\sqrt{35x} = 5\sqrt{x+2}$

$35x = 25(x+2)$

$35x = 25x + 50$

$10x = 50$

$\boxed{x = 5}$

Ck $\sqrt{35(5)} \stackrel{?}{=} 5\sqrt{5+2}$

$\sqrt{175} \stackrel{?}{=} 5\sqrt{7}$

$\sqrt{25 \cdot 7} \stackrel{?}{=} 5\sqrt{7}$

$\sqrt{25}\sqrt{7} \stackrel{?}{=} 5\sqrt{7}$

$5\sqrt{7} = 5\sqrt{7}$ ✓

(Ex) $-1713 = -5N^{\frac{3}{2}} + 2$

$\frac{-1713}{-5} = N^{\frac{3}{2}}$

$(343)^{\frac{2}{3}} = \left(N^{\frac{3}{2}}\right)^{\frac{2}{3}}$

$\left(\sqrt[3]{343}\right)^2 = N$

$(7)^2 = N$

$N = 49$

$49 \times 7 = 343$

Ck $-1713 \stackrel{?}{=} -5(49)^{\frac{3}{2}} + 2$

$-1713 \stackrel{?}{=} -5(343) + 2$

$-1713 \stackrel{?}{=} -1715 + 2$ ✓

WS

(31) $-9 = -1 - 2p^{\frac{1}{2}}$

$\frac{-8}{-2} = \frac{-2p^{\frac{1}{2}}}{-2}$

$(4)^{\frac{2}{1}} = (p^{\frac{1}{2}})^{\frac{2}{1}}$

$\boxed{16 = p}$

CK $-9 \stackrel{?}{=} -1 - 2(16.)^{\frac{1}{2}}$

$-9 \stackrel{?}{=} -1 - 8$ ✓

---

(32) $2916 = 4x^{\frac{3}{2}}$

$\frac{2916}{4} = x^{\frac{3}{2}}$

$(729)^{\frac{2}{3}} = (x^{\frac{3}{2}})^{\frac{2}{3}}$

$(\sqrt[3]{729})^2 = x$

$(9)^2 = x$

$\boxed{81 = x}$

CK $2916 \stackrel{?}{=} 4(81)^{\frac{3}{2}}$

$2916 \stackrel{?}{=} 4(9)^3$

$2916 \stackrel{?}{=} 4(729)$

$2916 \stackrel{?}{=} 2916$ ✓

$$81^{\frac{3}{2}} = \left(\sqrt[2]{81}\right)^3 = (9)^3 = 729$$

$$81^{\frac{3}{2}} = \sqrt[2]{81^3} = \sqrt[2]{81 \cdot 81 \cdot 81}$$

$$= \sqrt[2]{81} \cdot \sqrt[2]{81} \cdot \sqrt[2]{81}$$

$$\left(\sqrt[2]{81}\right)^3$$

$$a^{\frac{m}{n}} = \left(\sqrt[n]{a}\right)^m \text{ or } \sqrt[n]{a^m}$$

FER