PreCalculus 11 Name_____
Date_____

5.3 Solving Radical Equations

A ***Radical Equation*** is an equation involving radicals with variables in the radicand.

Because of this, we will have give restrictions on variables that need to be stated before we start to solve.

To solve a radical equation, we will isolate the radical, then square both sides, and finally solve for the variable.

Example 1: p.296 – State restrictions, then solve for *x:*

$$5+\sqrt{2x-1}=12$$

$2x-1 \geq 0$

$2x \geq 1$

$x \geq \frac{1}{2}$

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

$\left(\sqrt{2x-1}\right)^2 = 7^2$

$2x-1 = 49$

$2x = 50$

$x = 25$

We should always check our solutions, as squaring both sides may give us Extraneous Roots.

Check: $5+\sqrt{2(50)-1} = 12$

$5+\sqrt{49} = 12$

$5+7 = 12$

$12 = 12$ ✓

Example 2: Solve for x: $\sqrt{x+3}+8=6$

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

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

$x+3 = 4$

$x = 1$

but $\sqrt{1+3}+8 = 6$

$2+8 = 6$

$10 \neq 6$

No Answer

Example 3: p. 297 - State restrictions, then solve for *n:*

$n-\sqrt{5-n}=-7$

$-\sqrt{5-n} = -7-n$

$\left(\sqrt{5-n}\right)^2 = (7+n)^2$

$5-n = 49+14n+n^2$

$0 = 44+15n+n^2$

$n^2+15n+44=0$

$(n+4)(n+11)=0$

$n=-4$ or -11

$5-n \geq 0$

$-n \geq -5$

$n \leq 5$

$n=-4$

$-4-\sqrt{5--4} = -7$

$-4-\sqrt{9} = -7$

$-4-3$ ✓

$n=-11$

$-11-\sqrt{5--11} = -7$

$-11-\sqrt{16} = -7$

$-11-4 = -7$

$-15 = -7$

No

$n=-4$ only

If an equation has two radicals, we may have to square twice in order to solve.

Example 4: State restrictions, and solve for x:

$\sqrt{9x+1}-\sqrt{4x-2}=3$

$4x-2 \geq 0$, $4x \geq 2$, $x \geqslant \frac{1}{2}$

$9x+1 \geqslant 0$, $9x \geqslant -1$, $x \geqslant -\frac{1}{9}$

$\left(\sqrt{9x+1}\right)^2 = \left(3+\sqrt{4x-2}\right)^2$

$9x+1 = 9 + 6\sqrt{4x-2} + 4x-2$

$\left(5x-6\right)^2 = \left(6\sqrt{4x-2}\right)^2$

$25x^2-60x+36 = 36(4x-2)$

$25x^2-60x+36 = 144x-72$

$25x^2-204x+108 = 0$

$x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$

$= 7.6$ or 0.6

Check on Calc. ☺ Check on Calc. ☺

Assignment: p. 300 #3-7abc, 10ac, 12-15