5.3 Radical Equations

Radical equations: equations where the variable is in the radicand.

Restrictions

1. $\sqrt{2x-10}$

$2x-10 \geq 0$

$2x \geq 10$

$x \geq 5$

2. $\sqrt{3x+17}$

$3x+17 \geq 0$

$3x \geq -17$

$x \geq -\frac{17}{3}$

Solving equations

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

Restriction

$2x - 1 \geq 0$

$2x \geq 1$

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

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

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

$2x - 1 = 49$

$2x = 50$

$x = 25$

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

$5-n \geq 0$

$-n \geq -5$

$n \leq 5$

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

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

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

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

factor or quad. formula

add = 15
mult = 44
4 + 11

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

$n+11=0$ | $n+4=0$

$n=-11$ | $n=-4$

Check:

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

$n=-11$

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

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

$-11-4 = -7$

$n=-4$

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

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

$-4-3 = -7$

$n=-4$

3. $7+\sqrt{3x} = \sqrt{5x+4} + 5$, $x \geq 0$

$(2+\sqrt{3x})^2 = (\sqrt{5x+4})^2$

$4+4\sqrt{3x}+3x = 5x+4$

$(4\sqrt{3x})^2 = (2x)^2$

$16 \cdot 3x$

$48x = 4x^2$

$12x = x^2$

$0 = x^2 - 12x$ G.C.F

$x(x-12) = 0$

$x = 0$ { $x-12=0$, $x=12$

$(2+\sqrt{3x})(2+\sqrt{3x})$

$2(2+\sqrt{3x})+\sqrt{3x}(2+\sqrt{3x})$

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

$4+4\sqrt{3x}+3x$

Check both, they both work!

Practice pg. 300

4c, 6a,b, 7d, 10a,c