Name Schlansky
Mr. Schlansky

Date ____________
Algebra II

Solving Radical Equations

Solve the following radical equations and CHECK each solution

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

$x - 4 = 36$
$+4 \quad +4$
$x = 40$ ✓

2. $5\sqrt{4x-8} + 2 = 12$
$-2 \quad -2$
$\frac{5\sqrt{4x-8}}{5} = \frac{10}{5}$
$\left(\sqrt{4x-8}\right)^2 = (2)^2$
$4x - 8 = 4$
$+8 \quad +8$
$\frac{4x}{4} = \frac{12}{4}$
$x = 3$ ✓

3. $5 + \sqrt[3]{x+5} = 7$
$-5 \quad -5$
$\left(\sqrt[3]{x+5}\right)^3 = (2)^3$
$x + 5 = 8$
$-5 \quad -5$
$x = 3$

4. $\left(\sqrt[3]{x}\right)^3 = (x)^3$
$x = x^3$
$-x \quad -x$
$0 = x^3 - x$
$0 = x(x^2 - 1)$
$0 = x(x+1)(x-1)$
$x = 0 \quad x = -1 \quad x = 1$
✓ ✓ ✓

5. $4 - \sqrt{2x-5} = 1$
$-4 \quad -4$
$\frac{-\sqrt{2x-5}}{-1} = \frac{-3}{-1}$
$\left(\sqrt{2x-5}\right)^2 = (3)^2$
$2x - 5 = 9$
$+5 \quad +5$
$\frac{2x}{2} = \frac{14}{2}$
$x = 7$ ✓

6. $\left(\sqrt{x^2 + x}\right)^2 = \left(\sqrt{4x+10}\right)^2$
$x^2 + x = 4x + 10$
$-4x - 10 \quad -4x - 10$
$x^2 - 3x - 10 = 0$
$(x-5)(x+2) = 0$
$x = 5 \quad x = -2$
✓ ✓

7. $(x)^2 = (\sqrt{7x-12})^2$

$x^2 = 7x - 12$
$-7x+12 \quad -7x+12$

$x^2 - 7x + 12 = 0$

$(x-4)(x-3) = 0$

$x = 4 \mid x = 3$

✓ ✓

8. $(x+4)^2 = (\sqrt{x+6})^2$

SBT $(x+4)^2 = x+6$

$x^2 + 8x + 16 = x + 6$
$-x-6 \quad -x-6$

$x^2 + 7x + 10 = 0$

$(x+5)(x+2) = 0$

$\cancel{x = -5} \mid x = -2$ ✓

extraneous solution ~~root~~

9. $x = 1 + \sqrt{x+5}$
$-1 \quad -1$

SBT $(x-1)^2 = (\sqrt{x+5})^2$

$x^2 - 2x + 1 = x + 5$
$-x-5 \quad -x-5$

$x^2 - 3x - 4 = 0$

$(x-4)(x+1)$

$x = 4 \mid \cancel{x = -1}$ extraneous solution

10. $3 = -x + \sqrt{x+5}$
$+x \quad +x$

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

$x^2 + 6x + 9 = x + 5$
$-x-5 \quad -x-5$

$x^2 + 5x + 4 = 0$

$(x+4)(x+1) = 0$

$\cancel{x = -4} \mid x = -1$ ✓

extraneous solution

11. $x = 2 + \sqrt{x+4}$
$-2 \quad -2$

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

$x^2 - 4x + 4 = x + 4$
$-x-4 \quad -x-4$

$x^2 - 5x = 0$

$x(x-5) = 0$

$\cancel{x = 0} \mid x = 5$ ✓

extraneous solution

12. $(\sqrt{4y+3})^2 = (2y)^2$

$4y + 3 = 4y^2$
$-4y-3 \quad -4y-3$

$0 = 4y^2 - 4y - 3$ PT

$0 = y^2 - 4y - 12$

$(y - \frac{6}{4})(y + \frac{2}{4})$

$(y - \frac{3}{2})(y + \frac{1}{2})$

$(2y-3)(2y+1) = 0$

$2y - 3 = 0 \mid 2y + 1 = 0$
$+3 \; +3 \mid -1 \; -1$

$\frac{2y}{2} = \frac{3}{2} \mid \frac{2y}{2} = \frac{-1}{2}$

$y = \frac{3}{2}$ ✓ $\mid \cancel{y = -\frac{1}{2}}$

extraneous solution

SBT

13. $\sqrt{x-5}+x=7$

$-x \quad -x$

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

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

$-x+5 \quad +5 \; -x$

$x^2-15x+54=0$

$(x-9)(x-6)=0$

$\cancel{x=9}$ | $x=6$

extraneous solution

14. $\sqrt{2x-7}+x=5$

$-x \quad -x$ SBT

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

$2x-7=x^2-10x+25$

$-2x+7 \quad -2x+7$

$0=x^2-12x+32$

$0=(x-8)(x-4)$

$\cancel{x=8}$ $x=4$

extraneous solution

15. Solve algebraically for all values of x: $\sqrt{x-4}+x=6$

$-x \quad -x$

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

$x-4=x^2-12x+36$

$-x+4 \quad -x+4$

$0=x^2-13x+40$

$0=(x-8)(x-5)$

$\cancel{x=8}$ | $x=5$

extraneous solution

mc strategy

16. The solution set for the equation $\sqrt{x+14}-\sqrt{2x+5}=1$ is

1) $\{-6\}$ 0
2) $\{2\}$ 1
3) $\{18\}$
4) $\{2, 22\}$ 0

mc strategy

17. The solution set for the equation $\sqrt{56-x}=x$ is

1) $\{-8, 7\}$ 0
2) $\{-7, 8\}$
3) $\{7\}$ 1
4) $\{\,\}$

18. Solve algebraically for x: $\sqrt{x^2+x-1} + 11x = 7x+3$

$-11x \quad -11x$

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

$x^2+x-1 = 16x^2-24x+9$

$-x^2-x+1 \quad -x^2-x+1$

$\frac{0}{5} = \frac{15x^2}{5} - \frac{25x}{5} + \frac{10}{5}$

$0 = 3x^2-5x+2$ PT

x^2-5x+6

$\frac{(x-3)}{3}\frac{(x-2)}{3}$

$0=(x-1)(3x-2)$

$x=1$ | $x=\frac{2}{3}$ ✓

Extranus Solution

19. The speed of a tidal wave, s, in hundreds of miles per hour, can be modeled by the equation $s = \sqrt{t} - 2t + 6$, where t represents the time from its origin in hours. Algebraically determine the time when $s = 0$.

$0 = \sqrt{t} - 2t + 6$

$+2t-6 \quad +2t-6$

SBT $(2t-6)^2 = (\sqrt{t})^2$

$4t^2-24t+36 = t$

$-t \quad -t$

$4t^2-25t+36=0$

$t^2-25t+144$

$\left(t-\frac{16}{4}\right)\left(t-\frac{9}{4}\right)$

$(t-4)(4t-9)=0$

$t-4=0 \quad 4t-9=0$

$+4 \; +4 \quad +9 \; +9$

$t=4 \quad \frac{4t}{4}=\frac{9}{4}$

$t=\frac{9}{4}$

Extranious Solution