Precalculus 11 – Flashback #4

Solve. State any restrictions and verify solution.

1. $(\sqrt{5x-2})^2 = (4)^2$

restrictions: $5x-2 \geq 0$, $5x \geq 2$, $x \geq 2/5$

$5x-2=16$

$5x=18$

$x=18/5$

check

$\sqrt{5(\frac{18}{5})-2} = 4$

$\sqrt{18-2} = 4$

$\sqrt{16} = 4$

$4 = 4$ ✓

2. $(m+8)(m-5) = (2m-3)(2m+1) - 43$

$m^2+3m-40 = 4m^2-4m-3-43$

Quadratic

$0 = 3m^2-7m-6$

b^2-4ac

$(-7)^2-4(3)(-6)$

$49+72$

121 → perfect square → 2 roots (rational!)

$\therefore x = \frac{+7 \pm \sqrt{121}}{6}$

$x = \frac{+7 \pm 11}{6}$ →

$x_1 = \frac{+7+11}{6}$ $\quad x_2 = \frac{+7-11}{6}$

$x_1 = \frac{18}{6}$ $\quad x_2 = \frac{-4}{6}$

$x_1 = 3$ $\quad x_2 = -2/3$

3. $\frac{-2}{x+3} - \frac{5}{x} = 2$ $\quad x \neq -3, 0$

(multiply by x and by $x+3$)

$\frac{-2x-5x-15}{x(x+3)} = \frac{2}{1}$

$\frac{-7x-15}{x(x+3)} = \frac{2}{1}$

$-7x-15 = 2x^2+6x$

$0 = 2x^2+13x+15$

Product +30, ++ −−

1·30

2·15

3·10

$0 = (2x+3)(x+5)$

$x_1 = \frac{3}{2}$ $\quad x_2 = -5$

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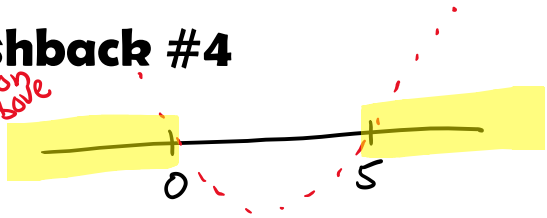
4. $x(x-5) > 0$

$x=0 \quad x=5$

where is the function $x(x-5)$ above zero



$\therefore x<0$ or $x>5$

5. $2(x-3)^2+9=1$

$\frac{2}{2}(x-3)^2 = \frac{-8}{2}$

$\sqrt{(x-3)^2} = \sqrt{-4}$ ← can't do this

$\therefore$ NO Solution

6. $2\sqrt{3x-7}+5=11$

restrictions

$2\sqrt{3x-7} = 6$

$(\sqrt{3x-7})^2 = (3)^2$

$3x-7 = 9$

$3x = 16$

$x = 16/3$

$3x-7 \geq 0$

$3x \geq 7$

$x \geq 7/2$

compare $x \geq \frac{21}{6}$

verify

$2\sqrt{3\cdot\frac{16}{3}-7}+5=11$

$2\sqrt{16-7}+5=11$

$2\sqrt{9}+5=11$

$2\cdot 3+5=11$

$11=11$ ✓

7. $5x^2 = -3x+1$

$5x^2+3x-1=0$

$a \quad b \quad c$

b^2-4ac

$9-4(5)(-1)$

$9+20$

$29 \rightarrow$ 2 irrational roots

$x = \frac{-3 \pm \sqrt{29}}{10}$

8. $4x^2+12x \leq 7$ → below zero

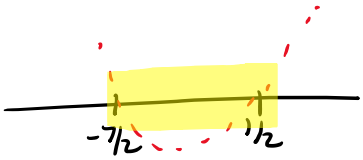
$4x^2+12x-7 \leq 0$

$(2x-1)(2x+7) \leq 0$

$2x-1=0 \quad 2x+7=0$

$2x=1 \quad 2x=-7$

$x=\frac{1}{2} \quad x=\frac{-7}{2}$



$\therefore -\frac{7}{2} \leq x \leq \frac{1}{2}$

Product -28 +-

$1\cdot 28$

$2\cdot 14$

$4\cdot 7$

	$2x$	-1
$2x$	$4x^2$	$-2x$
7	$+14x$	-7

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9. $x = \sqrt{10 - 3x}$

$(x)^2 = (\sqrt{10-3x})^2$

restriction: $10 - 3x \geq 0$, $-3x \geq -10$, $x \leq 10/3$

$x^2 = 10 - 3x$

$x^2 + 3x - 10 = 0$

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

$\therefore$ $x_1 = -5$ extraneous; $x_2 = 2$

verify: $-5 = \sqrt{10 - 3(-5)}$ not possible

10. $\frac{2x-3}{x+2} - \frac{x+2}{x-1} = \frac{3x}{x-1}$ $x \neq -2, 1$

same!

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

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

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

$(2x-3)(x-1) = (x+2)(4x+2)$

$2x^2 - 5x + 3 = 4x^2 + 10x + 4$

$0 = 2x^2 + 15x + 1$ (a, b, c)

$b^2 - 4ac$

$15^2 - 4(2)(1)$

$225 - 8$

217 ← 2 irrational roots

$x = \frac{-15 \pm \sqrt{217}}{4}$

11. $2y^2 - 7 = 65$

$2y^2 = 72$

$y^2 = 36$

$y = \pm 6$

12. $2a^2 + 15 = 13a$

$2a^2 - 13a + 15 = 0$

$(2a-3)(a-5) = 0$

$a = \frac{3}{2}$ $a = 5$

$2a^2$	$-3a$
$-10a$	$+15$

30: 1·30, 2·15, 3·10, 5·6

13. $4 - 5\sqrt{6x} = -5 - 4\sqrt{6x}$ Like terms

$9 = 5\sqrt{6x} - 4\sqrt{6x}$

$(9)^2 = (\sqrt{6x})^2$ restriction: $6x \geq 0$, $x \geq 0$

$81 = 6x$

$\frac{81}{6} = x$

$\frac{27}{2} = x$ compare

verify:

$4 - 5\sqrt{6 \cdot \frac{27}{2}} = -5 - 4\sqrt{6 \cdot \frac{27}{2}}$

$4 - 5\sqrt{81} = -5 - 4\sqrt{81}$

$4 - 5(9) = -5 - 4 \cdot 9$

$4 - 45 = -5 - 36$

$-41 = -41$ ✓

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14. $\frac{4}{x-3} = \frac{24}{2x-6}$

$2(x-3)$

$\therefore \quad \frac{8}{2(x-3)} = \frac{24}{2(x-3)}$

$8 = 24$

??

No solution

15. $3x - 2 \leq 6(x + 7)$

$3x - 2 \leq 6x + 42$

$-2 \leq 3x + 42$

$-44 \leq 3x$

$-\frac{44}{3} \leq x$