

Radical Functions

Wednesday, April 13, 2016 12:46 PM

I hear you like radicals, so I
put a radical in your radical,
so you can radical while you
radical.



It looks tougher than it is... I promise.

We do the same things.

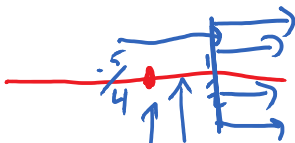
1. Isolate the radical
 - Get the root alone on one side of the equation
2. Square both sides
 - This gets rid of the radical. Back to easy mode after this!
repeat as necessary
 - Now we just have to do this step one more time.
3. Solve for x
4. Check for extraneous roots
 - Sometimes you may find answers that are not allowed.
Non Permissible Values (NPV)

restriction

$$\begin{aligned}4x+5 &\geq 0 \\4x &\geq -5 \\x &\geq -\frac{5}{4}\end{aligned}$$

$$2x-1 \geq 0$$

$$\begin{aligned}2x &\geq 1 \\x &\geq \frac{1}{2}\end{aligned}$$



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

$$\text{then } x \geq -\frac{5}{4}$$

$$\begin{aligned}& \textcircled{1} \quad \textcircled{2} \\& \left[\sqrt{4x+5} - \sqrt{2x-1} = 2 \right] \\& (\sqrt{4x+5})^2 = (2 + \sqrt{2x-1})^2\end{aligned}$$

$$\begin{aligned}\sqrt{2}\sqrt{2} &= \sqrt{2 \cdot 2} \\&= \sqrt{4} \\&= 2\end{aligned}$$

$$\begin{aligned}4x+5 &= 4 + 2\sqrt{2x-1} + 2\sqrt{2x-1} + 2x-1 \\4x+5 &= 4 + 4\sqrt{2x-1} + 2x-1 \\4x+5 - 4 - 2x + 1 &= 4\sqrt{2x-1} \\(2x+2)^2 &= (4\sqrt{2x-1})^2\end{aligned}$$

$$4x^2 + 4x + 4x + 4 = 16(2x-1)$$

$$4x^2 + 8x + 4 = 16(2x-1)$$

$$4x^2 + 8x + 4 = 32x - 16$$

$$4x^2 + 8x - 32x + 4 + 16 = 0$$

$$4x^2 - 24x + 20 = 0$$

$$x = 5, 1$$

check

$$x=5 \quad \sqrt{4(5)+5} - \sqrt{2(5)-1} = 2$$

$$\sqrt{25} - \sqrt{9} = 2$$

$$5 - 3 = 2$$

Yay

$$\sqrt{4+5} - \sqrt{2-1} = 2$$

$$\sqrt{9} - 1 = 2$$

$$3 - 1 = 2$$

Yay

check 0, 12

$$7 + 0 = \sqrt{4} + 5$$

$$7 = 2 + 5$$

Yay

$$7 + \sqrt{3(12)} = \sqrt{5(12)+4} + 5$$

$$7 + \sqrt{36} = \sqrt{64} + 5$$

$$7 + 6 = 8 + 5$$

$$13 = 13$$

Yay

$$7 + \sqrt{3x} = \sqrt{5x+4} + 5$$

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

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

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

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

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

$$16(3x) = 4x^2$$

$$48x = 4x^2$$

$$4x^2 - 48x = 0$$

$$4(x^2 - 12x) = 0$$

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

$$x(x - 12) = 0$$

$$\downarrow$$
$$x = 0$$

✓
✓

$$\swarrow$$
$$x - 12 = 0$$

$$x = 12$$

✓
✓

restrictions

$$3x \geq 0$$

$$x \geq 0$$

$$5x + 4 \geq 0 \leftarrow$$

$$5x \geq -4 \leftarrow$$

$$x \geq -\frac{4}{5} \leftarrow$$

$$\therefore x \geq 0$$

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

$$x = 7$$

$$2x - 5 = x + 2$$

$$2x - x - 5 - 2 = 0$$

$$x - 7 = 0$$

$$x = 7$$



check

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

$$\sqrt{9} = \sqrt{9}$$

$x=7$

restriction

$$2x - 5 \geq 0$$

$$x \geq \frac{5}{2}$$

$$x + 2 \geq 0$$

$$x \geq -2$$

$$\therefore x \geq \frac{5}{2}$$

HW: Pg: 301
#9abc,10