

February 1, 2012

*No homework to correct today
because of the assembly... Get out
your notes.*



2/1 - Solving Radical Equations

If $a = b$,
then $a^n = b^n$

True or False?

usually
true

$$x^2 = \sqrt{3}^2$$
$$\sqrt{x^2} = \sqrt{\sqrt{3}^2}$$
$$x = \pm\sqrt{3}$$

Solve for x.

$$\cancel{3}\sqrt{x} = 4^{\cancel{3}} \quad 3$$

$$x = 64$$

✓

so it works

$$\sqrt[4]{x} - 3 = 0$$

$$\sqrt[4]{x} + 3 + 3 = 3^4$$

$$x = 81$$

✓

Solve for x. Check all of your answers!

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

FOIL

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

$$-x \quad -x$$

$$x^2 - 13x + 36 = 0$$

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

$$\cancel{x=4}$$

$$x=9$$

$$4-6 = \sqrt{4}$$

$$-2 \neq 2$$

$$9-6 = \sqrt{9}$$

$$3 = 3$$

Extraneous Roots

Extraneous Solutions

Extraneous solutions are those solutions encountered when solving an equation or system of **equations** that at first glance appear reasonable, but do not actually satisfy the original conditions of the problem. Extraneous solutions can occur with any type of equation--including differential equations--but most often occur when a problem involves applying the square, quartic, or any other even-numbered power to both sides of an equation. Extraneous solutions also sometimes occur when the problem involves a radical term (that is, a term with a non-integer exponent) or trigonometric function, or when the restrictions on the domains of terms in the equation(s) are not well-considered.

Answers that don't actually work when you check

Watch for raising both sides to an even power.

Solve for x. Check for extraneous solutions.

$$\sqrt{3x-1} + 1 = 3$$

$$\sqrt{3x-1} = 2$$

$$3x-1 = 4$$

$$3x = 5$$

$$\sqrt{3 \cdot \frac{5}{3} - 1} + 1 = 3$$

$$\sqrt{5-1} + 1 = 3$$

$$x = \frac{5}{3}$$

1. Isolate the $\sqrt{\quad}$

2. Square both sides

3. Solve for x.

4. Check it

Solve for x. Check for extraneous solutions.

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

$$x-2 = 4$$

+2 +2

~~$x = 6$~~

$$(6-2)^{\frac{2}{3}} = -8$$

$$4^{\frac{2}{3}} = -8$$

$$2^3 \neq -8$$

$$\sqrt[3]{-8}^2$$
$$= (-2)^2$$
$$= 4$$

no solution

Solve for x. Check for extraneous solutions.

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

$$x+3 = 2x-1$$

$$3 = x-1$$

$$4 = x$$

$$\sqrt{4+3} \stackrel{?}{=} \sqrt{2 \cdot 4 - 1}$$

✓

Solve for x. Check for extraneous solutions.

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

1. Isolate ONE $\sqrt{\quad}$

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

2. Square both sides

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

$$2x+3 = 9 - 6\sqrt{2x} + 2x$$

3. Isolate the other $\sqrt{\quad}$

$$2x - 6 = -6\sqrt{2x} + 2x$$

4. Solve for x

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

5. Check

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

$$1 = 2x$$

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

$$\sqrt{2 \cdot \frac{1}{2} + 3} = 3 - \sqrt{2 \cdot \frac{1}{2}}$$

Homework

Page 378 #12-40 evens

Test

Tuesday *Due* Friday?