

Show your work to receive credit!!! If you factor or use a formula (like the quadratic formula, or a variation equation), I need to see the step where you put the numbers into the formula!

1. Solve each equation. Find all solutions, both real and complex. Show all work! (6pts ea)

a) $5x^2 - 45 = 0$

$$5x^2 = 45$$

$$x^2 = 9$$

$$x = \pm 3$$

b) $3x^2 = 6x$

$$3x^2 - 6x = 0$$

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

$$x = 0 \text{ or } x = 2$$

c) $x^2 - 18 = -9x$

$$x^2 + 9x - 18 = 0$$

$$a=1, b=9, c=-18$$

$$x = \frac{-9 \pm \sqrt{81 - 4(1)(-18)}}{2}$$

$$x = \frac{-9 \pm \sqrt{153}}{2} \text{ or } \frac{-9 \pm 3\sqrt{17}}{2}$$

$$x \approx 1.685 \text{ or } -10.685$$

d) $2x^2 + 3x + 4 = 0$

$$a=2, b=3, c=4$$

$$x = \frac{-3 \pm \sqrt{9 - 4(2)(4)}}{2(2)} = \frac{-3 \pm \sqrt{-23}}{4}$$

$$x = \frac{-3 \pm \sqrt{23}i}{4} \text{ or } -\frac{3}{4} \pm \frac{\sqrt{23}i}{4}$$

$$\text{or } -\frac{3}{4} \pm 4.796i$$

f) $x^4 - 3x^3 = 4x^2 - 12x$

$$x^4 - 3x^3 - 4x^2 + 12x = 0$$

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

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

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

$$x = 3 \text{ or } 0 \text{ or } \pm 2$$

e) $2x^3 + 5x^2 = 3x$

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

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

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

$$x = 0 \text{ or } \frac{1}{2} \text{ or } -3$$

g) $x^4 - 2x^2 - 8 = 0$

Let $w = x^2$, then $w^2 = x^4$

$$\Rightarrow w^2 - 2w - 8 = 0$$

$$\Rightarrow (w-4)(w+2) = 0$$

$$w = 4 \text{ or } w = -2$$

$$\Rightarrow x^2 = 4 \text{ or } x^2 = -2$$

$$x = \pm 2 \text{ or } \pm \sqrt{2}i$$

2. Solve each equation. Find all solutions, both real and complex. Show all work!

$x \neq 5$
7pts a) $\left[x - \frac{15}{x-5} = 1 + \frac{10-5x}{(x-5)} \right] (x-5)$

$$x(x-5) - 15 = (x-5) + (10-5x)$$

$$x^2 - 5x - 15 = -4x + 5$$

$$x^2 - x - 20 = 0$$

$$(x-5)(x+4) = 0$$

$$x = \cancel{5} \text{ or } -4$$

\uparrow
extraneous

7pts
b) $x+3 = \sqrt{x+8}$

$$(x+3)^2 = (\sqrt{x+8})^2$$

$$x^2 + 6x + 9 = x + 8$$

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

$$a=1, b=5, c=1$$

$$x = \frac{-5 \pm \sqrt{25 - 4(1)(1)}}{2(1)}$$

$$x = \frac{-5 \pm \sqrt{21}}{2}$$

or $x = -0.209$ or $\cancel{-4.791}$

\uparrow
extraneous

a $\frac{-5 + \sqrt{21}}{2}$

or $\frac{-5 - \sqrt{21}}{2}$