

1. (15pts) Solve the following quadratic equations:

$$2x^2 - 39 = 11 \quad | + 39$$

$$2x^2 = 50$$

$$x^2 = 25$$

$$x = \pm 5$$

$$x^2 + 2x = 24$$

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

$$(x+6)(x-4) = 0$$

$$x = -6, x = 4$$

$$18x^2 - x = 8x + 2$$

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

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

$$= \frac{9 \pm \sqrt{81 + 144}}{36}$$

$$= \frac{9 \pm \sqrt{225}}{36} = \frac{9 \pm 15}{36}$$

$$= \frac{24}{36}, \frac{-6}{36} = \frac{2}{3}, -\frac{1}{6}$$

$$2x^2 - 8x = x^2 + 6x - 3$$

$$x^2 - 14x + 3 = 0$$

$$x = \frac{-(-14) \pm \sqrt{(-14)^2 - 4 \cdot 1 \cdot 3}}{2 \cdot 1}$$

$$= \frac{14 \pm \sqrt{196 - 12}}{2}$$

$$= \frac{14 \pm \sqrt{184}}{2}$$

$$= \frac{14 \pm \sqrt{4 \cdot 46}}{2} = \frac{14 \pm 2\sqrt{46}}{2}$$

$$= 7 \pm \sqrt{46}$$

2. (8pts) Solve the following equations:

$$|3x - 1| = 7$$

$$3x - 1 = 7 \text{ or } 3x - 1 = -7$$

$$3x = 8$$

$$x = \frac{8}{3}$$

$$3x = -6$$

$$x = -2$$

$$x + 2 = \sqrt{5x + 24} \quad |^2$$

$$x^2 + 4x + 4 = 5x + 24$$

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

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

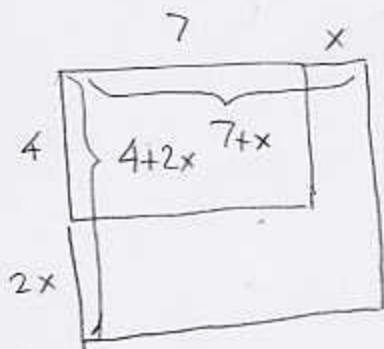
$$x = -4, 5$$

$$\text{Check: } -4 + 2 \stackrel{?}{=} \sqrt{-20 + 24} \quad 5 + 2 \stackrel{?}{=} \sqrt{25 + 24}$$

$$-2 = \sqrt{4} \text{ no} \quad 7 = \sqrt{49} \text{ yes}$$

$x = 5$ is the solution

3. (7pts) You have a rectangular plot of length 7 feet and width 4 feet and would like to enlarge it so its area is 35 square feet. To this end, you increase the length by x feet and increase the width by $2x$ feet. By how much did you need to increase the length and width of the rectangle to achieve the desired area?



$$l \cdot w = \text{area}$$

$$(7+x)(4+2x) = 35$$

$$28 + 18x + 2x^2 = 35$$

$$2x^2 + 18x - 7 = 0$$

$$x = \frac{-18 \pm \sqrt{18^2 - 4 \cdot 2 \cdot (-7)}}{2 \cdot 2}$$

$$= \frac{-18 \pm \sqrt{324 + 56}}{4} = \frac{-18 \pm \sqrt{380}}{4} = \frac{-18 \pm 2\sqrt{95}}{4} = \frac{-9 \pm \sqrt{95}}{2}$$

$$= 0.37, -9.37$$

Only $x = 0.37$

works, since

x has to be positive.