

Warm-up

Solve.

$$\frac{3x^2}{3} + \frac{42x}{3} = \frac{-24}{3}$$

$$x^2 + 14x + 49 = -8 + 49$$

$$\frac{14}{2} = 7$$

$$7 \cdot 7 = 49$$

$$(x+7)(x+7)$$

$$\sqrt{(x+7)^2} = \sqrt{41}$$

$$x+7 = \pm\sqrt{41}$$

$$x+7 = \pm\sqrt{41}$$

$$-7 \quad -7$$

$$x = -7 \pm \sqrt{41}$$

## 4.8 Quadratic Formula

If we have  $ax^2+bx+c=0$ , the solutions are

$$X = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

So for  $x^2+3x-4=0$   
 $a=1$   $b=3$   $c=-4$

$$X = \frac{-3 \pm \sqrt{9 - 4(1)(-4)}}{2(1)}$$

$$= \frac{-3 \pm \sqrt{9+16}}{2}$$

$$\sqrt{25} = 5$$

$$\frac{-3 \pm 5}{2} = \frac{2}{2}, \frac{-8}{2}$$

$x=1, -4$

②  $25x^2 - 18x = 12x - 9$

$$25x^2 - 30x + 9 = 0$$

$a=25$   $b=-30$   $c=9$

$$X = \frac{30 \pm \sqrt{900 - 4(25)(9)}}{50}$$

By hand:

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

$$(x-1)(x+4) = 0$$

$$x-1=0 \quad x+4=0$$

$$x=1 \quad x=-4$$

③  $-x^2 + 4x = 5$

$$-x^2 + 4x - 5 = 0$$

$a=-1$   $b=4$   $c=-5$

$$X = \frac{-4 \pm \sqrt{16 - 4(-1)(-5)}}{-2}$$

$$= \frac{-4 \pm 2i}{-2} = 2 \pm i$$

$$ax^2 + bx + c = 0$$

$$\frac{ax^2 + bx}{a} = -\frac{c}{a}$$

$$x^2 + \frac{b}{a}x + \frac{b^2}{4a^2} = -\frac{c}{a} + \frac{b^2}{4a^2}$$

$$\frac{a}{a} \cdot \frac{1}{2} = \frac{b}{2a}$$

$$\left(\frac{b}{2a}\right)^2 = \frac{b^2}{4a^2}$$

$$-\frac{c}{a} \cdot \frac{4}{4} = -\frac{4ac}{4a^2}$$

$$\sqrt{\left(x + \frac{b}{2a}\right)^2} = \sqrt{\frac{b^2 - 4ac}{4a^2}}$$

$$x + \frac{b}{2a} = \pm \frac{\sqrt{b^2 - 4ac}}{2a}$$

$$-\frac{b}{2a}$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Yes!