

BE-Alg. 2 | TUESDAY 11-15-11

Solve by completing the square:

$$\textcircled{1} \quad \frac{3x^2}{3} - \frac{5x}{3} + \frac{1}{3} = \frac{0}{3}$$

$$x^2 - \frac{5}{3}x + \text{cloud} = -\frac{1}{3} + \text{cloud}$$

$$x^2 - \frac{5}{3}x + \left\{\frac{25}{36}\right\} = -\frac{12}{36} + \left\{\frac{25}{36}\right\} = \frac{13}{36}$$

$$\swarrow \quad \searrow$$
$$\left(x - \frac{5}{6}\right)^2 = \frac{13}{36}$$

$$x - \frac{5}{6} = \pm \sqrt{\frac{13}{36}} = \pm \frac{\sqrt{13}}{\sqrt{36}} = \pm \frac{\sqrt{13}}{6}$$

$$x = \frac{5}{6} \pm \frac{\sqrt{13}}{6} = \boxed{\frac{5 \pm \sqrt{13}}{6} = x}$$

$$\text{ck} \quad 3\left(\frac{5+\sqrt{13}}{6}\right)^2 - 5\left(\frac{5+\sqrt{13}}{6}\right) + 1 \stackrel{?}{=} 0$$

$$3\left[\frac{25+10\sqrt{13}+13}{36}\right] - \left[\frac{25+5\sqrt{13}}{6}\right] + 1 \stackrel{?}{=} 0$$

$$\frac{38+10\sqrt{13}}{12} - \left[\frac{25+5\sqrt{13}}{6}\right] + 1 \stackrel{?}{=} 0$$

$$\frac{19+5\sqrt{13}}{6} - \left[\frac{25+5\sqrt{13}}{6}\right] + 1 \stackrel{?}{=} 0$$

$$\frac{19}{6} + \frac{5\sqrt{13}}{6} - \frac{25}{6} - \frac{5\sqrt{13}}{6} + 1 \stackrel{?}{=} 0 \checkmark$$

Homework review Pg. 311 #32-36

③② $x^2 - 8x + 15 = 0$

$$x^2 - 8x + \boxed{16} = -15 + \boxed{16} = 1$$

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

$$x - 4 = \pm\sqrt{1} = \pm 1 \quad \therefore \boxed{x = \{5, 3\}}$$

CK $(5)^2 - 8(5) + 15 \stackrel{?}{=} 0 \checkmark \quad \text{or} \quad (3)^2 - 8(3) + 15 \stackrel{?}{=} 0 \checkmark$

③③ $x^2 + 2x - 120 = 0$

$$x^2 + 2x + \boxed{1} = 120 + \boxed{1}$$

$$(x + 1)^2 = 121$$

$$x + 1 = \pm\sqrt{121} = \pm 11$$

$$x = -1 \pm 11 \quad \therefore \boxed{x = \{10, -12\}}$$

CK $(10)^2 + 2(10) - 120 \stackrel{?}{=} 0$

$$100 + 20 - 120 \stackrel{?}{=} 0 \checkmark$$

CK $(-12)^2 + 2(-12) - 120 \stackrel{?}{=} 0$

$$144 - 24 - 120 \stackrel{?}{=} 0 \checkmark$$

$$\textcircled{34} \quad x^2 + 2x - 6 = 0$$

$$x^2 + 2x + \{1\} = 6 + \{1\}$$

$$(x+1)^2 = 7$$

$$x+1 = \pm\sqrt{7}$$

$$\therefore \boxed{x = -1 \pm \sqrt{7}}$$

$$\begin{array}{l} \text{CK } (-1+\sqrt{7})^2 + 2(-1+\sqrt{7}) - 6 \stackrel{?}{=} 0 \\ \underbrace{1 - 2\sqrt{7} + 7}_{8-8} - 2 + 2\sqrt{7} - 6 \stackrel{?}{=} 0 \\ 8 - 8 \stackrel{?}{=} 0 \checkmark \end{array} \quad \left\{ \begin{array}{l} \text{CK } (-1-\sqrt{7})^2 + 2(-1-\sqrt{7}) - 6 \stackrel{?}{=} 0 \\ 1 + 2\sqrt{7} + 7 - 2 - 2\sqrt{7} - 6 \stackrel{?}{=} 0 \\ 8 - 8 \stackrel{?}{=} 0 \checkmark \end{array} \right.$$

$$\textcircled{35} \quad x^2 - 4x + 1 = 0$$

$$x^2 - 4x + \{4\} = -1 + \{4\} = 3$$

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

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

$$\therefore \boxed{x = 2 \pm \sqrt{3}}$$

$$\text{CK } (2+\sqrt{3})^2 - 4(2+\sqrt{3}) + 1 \stackrel{?}{=} 0$$

$$4 + 4\sqrt{3} + 3 - 8 - 4\sqrt{3} + 1 \stackrel{?}{=} 0 \checkmark$$

$$\text{CK } (2-\sqrt{3})^2 - 4(2-\sqrt{3}) + 1 \stackrel{?}{=} 0$$

$$4 - 4\sqrt{3} + 3 - 8 + 4\sqrt{3} + 1 \stackrel{?}{=} 0 \checkmark$$

$$\textcircled{36} \quad x^2 - 4x + 5 = 0$$

$$x^2 - 4x + \textcircled{4} = -5 + \textcircled{4}$$

$$(x-2)^2 = -1$$

$$x-2 = \pm\sqrt{-1} = \pm i$$

$$\boxed{x = 2 \pm i}$$

$$\underline{\underline{CK}} \quad (2+i)^2 - 4(2+i) + 5 \stackrel{?}{=} 0$$

$$4 + \underline{4i} + i^2 - 8 - \underline{4i} + 5 \stackrel{?}{=} 0$$

$$4 \quad -1 \quad -8 \quad +5 \stackrel{?}{=} 0 \checkmark$$

$$\underline{\underline{CK}} \quad (2-i)^2 - 4(2-i) + 5 \stackrel{?}{=} 0$$

$$4 - \underline{4i} + i^2 - 8 + \underline{4i} + 5 \stackrel{?}{=} 0$$

$$4 \quad -1 \quad -8 \quad +5 \stackrel{?}{=} 0 \checkmark$$

It would be nice to be able to tell if you could factor a quadratic (so you could solve it by factoring/ZPP). Otherwise you must Complete The Square.

There is a tool that tells you important facts about the quadratic. It is called the discriminant.

(Don't mix this up with the determinant of a matrix).

$$d = b^2 - 4ac = \underline{\text{discriminant}}$$

$d = \text{Perfect Square} \Rightarrow$ The solutions to the quadratic are rational and it can be factored

$d = \text{Perfect Square} = 0 \Rightarrow$ S/A BUT IT HAS A "double root", ie, it is a Perfect Square Trinomial

Ex. # 32 of homework:

$$x^2 - 8x + 15$$

$$a = 1 \quad b^2 - 4ac$$

$$b = -8 \quad (-8)^2 - 4(1)(15)$$

$$c = 15 \quad 64 - 60 = \boxed{4 = d} \quad \text{Perfect Square}$$

• RATIONAL ROOTS
• FACTORABLE

Ex. Try the Perfect Square Trinomial you created in # 32 by Completing The Square

$$x^2 - 8x + 16$$

$$a = 1 \quad b^2 - 4ac$$

$$b = -8 \quad (-8)^2 - 4(1)(16)$$

$$c = 16 \quad 64 - 64 = \boxed{0 = d} \quad \text{Perfect Square}$$

• RATIONAL
double roots

• Factorable, Perfect Square
Trinomial

• Homework Pg. 311 # 37, 38, 39, 41

Solve, plus find d & STATE WHICH quadratics could be factored.