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

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

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

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

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

which is known as the Quadratic Formula.

[1] $ax^2 + bx = c$

[2] $x^2 + \frac{b}{a}x = \frac{c}{a}$

[3] $x^2 + \frac{b}{a}x + \left[\frac{b}{2a}\right]^2 = \frac{c}{a} + \left[\frac{b}{2a}\right]^2$

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

[4] $\left(x + \frac{b}{2a}\right)^2 = \frac{c}{a} + \frac{b^2}{4a^2}$

[5] $x + \frac{b}{2a} = \pm\sqrt{\frac{c}{a} + \frac{b^2}{4a^2}}$

[6] $x = \frac{-b}{2a} \pm \sqrt{\frac{c}{a} + \frac{b^2}{4a^2}}$

Procedure for Solve Quadratic by Completing the Square.

[1] Terms with the unknown on left, constant terms on Right

[2] Divide by coefficient of the squared unknown.

[3] $\left(\frac{1}{2}\text{ of the Coefficient of the cross term}\right)^2$ and add that to both sides of equation

[4] Factor LHS into $(\quad)^2$

[5] Use THM $a^2 = b \Rightarrow a = \pm\sqrt{b}$.

[6] Solve for unknown

[7] Simplify answer

#2

$3m^2 - 2m - 3 = -m + m^2$

[1] $2m^2 - m = 3$

[2] $m^2 - \frac{1}{2}m = \frac{3}{2}$

[3] $m^2 - \frac{1}{2}m + \frac{1}{16} = \frac{3}{2} + \frac{1}{16}$

$\frac{1}{2}$ of $\frac{1}{2} = \frac{1}{4}$ and $(\frac{1}{4})^2 = \frac{1}{16}$

[4] $(m - \frac{1}{4})^2 = \frac{25}{16}$

[5] $m - \frac{1}{4} = \pm\sqrt{\frac{25}{16}}$

[6] $m = \frac{1}{4} \pm \sqrt{\frac{25}{16}}$

[7] $m = \frac{1 \pm 5}{4}$

$m = \frac{3}{2}$ or $m = -1$

#6

$2n^2 - 6n = -3n + 2$

$2n^2 - 3n = 2$

$n^2 - \frac{3}{2}n = 1$

$\frac{1}{2} \cdot \frac{3}{2} = \frac{3}{4}$

$(\frac{3}{4})^2 = \frac{9}{16}$

$n^2 - \frac{3}{2}n + \frac{9}{16} = 1 + \frac{9}{16}$

$(n - \frac{3}{4})^2 = \frac{25}{16}$

$n - \frac{3}{4} = \pm\sqrt{\frac{25}{16}}$

$n = \frac{3}{4} \pm \sqrt{\frac{25}{16}}$

$n = \frac{3}{4} \pm \frac{5}{4}$

$n = \frac{3 \pm 5}{4}$