

Review: Solving Quadratics

Method 1: (Factoring)

Trinomial Decomp.

$$\textcircled{1} \text{ b) } 3x^2 + 7x + 2 = 0$$

$$1 \times 6 = 6$$

$$1 + 6 = 7$$

$$(3x^2 + 1x)(6x + 2) = 0$$

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

$$1 \times 6$$

$$2 \times 3$$

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

$$\begin{array}{l|l} 3x+1=0 & x+2=0 \\ 3x=-1 & x=-2 \\ \hline x=-\frac{1}{3} & \end{array}$$

Method 2: Completing the Square:

$$\textcircled{1} \text{ b) } 3x^2 + 7x + 2 = 0$$

$$\frac{3x^2}{3} + \frac{7x}{3} = -\frac{2}{3}$$

$$x^2 + \frac{7}{3}x = -\frac{2}{3}$$

$$x^2 + \frac{7}{3}x + \frac{49}{36} = -\frac{2}{3} + \frac{49}{36}$$

$$\left(\frac{7}{3} \times \frac{1}{2} = \left(\frac{7}{6}\right)^2\right)$$

$$= \frac{49}{36}$$

$$\left(x + \frac{7}{6}\right)^2 = -\frac{24}{36} + \frac{49}{36}$$

$$\left(x + \frac{7}{6}\right)^2 = \frac{25}{36}$$

Square Root both sides

$$x + \frac{7}{6} = \pm \sqrt{\frac{25}{36}}$$

$$x + \frac{7}{6} = \pm \frac{5}{6}$$

$$x = -\frac{7}{6} \pm \frac{5}{6}$$

$$x = -\frac{7}{6} - \frac{5}{6}$$

$$x = -\frac{12}{6}$$

$$x = -2$$

$$x = -\frac{7}{6} + \frac{5}{6}$$

$$x = -\frac{2}{6}$$

$$x = -\frac{1}{3}$$

Common Factor

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

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

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

$$\textcircled{2} 3x^2 - 9x = 0$$

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

$$3x=0 \quad | \quad x-3=0$$
$$x=0 \quad | \quad x=3$$

* Difference of Squares:

$$a^2 - b^2$$
$$(a+b)(a-b)$$

$$\textcircled{1} x^2 - 9 = 0$$

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

$$x+3=0 \quad | \quad x-3=0$$
$$x=-3 \quad | \quad x=3$$

$$\textcircled{2} 4x^2 - 16 = 0 \quad \text{C.F.}$$

$$4(x^2 - 4) = 0 \quad \text{D.O.S.}$$

$$4(x+2)(x-2) = 0$$

$$x+2=0 \quad | \quad x-2=0$$
$$x=-2 \quad | \quad x=2$$

Completing the Square:

$$\textcircled{a} \text{ d) } 9x^2 - 12x - 32 = 0$$
$$\frac{9x^2}{9} - \frac{12x}{9} = \frac{32}{9}$$

does not reduce

$$x^2 - \frac{4}{3}x + \frac{16}{36} = \frac{32}{9} + \frac{16}{36} \quad \left[\frac{-4}{3}\right] \times \frac{1}{2} = \left(\frac{-4}{6}\right)^2 = \frac{16}{36}$$

$$\left(x - \frac{2}{3}\right)^2 = \frac{32}{9} + \frac{4}{9}$$

$$\left(x - \frac{2}{3}\right)^2 = \frac{36}{9}$$

$$\left(x - \frac{2}{3}\right)^2 = 4 \quad * \text{ Square Root both sides}$$

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

$$x = \frac{2}{3} \pm 2$$

$$x = \frac{2}{3} - 2$$

$$x = \frac{2}{3} - \frac{6}{3}$$

$$x = -\frac{4}{3}$$

$$x = \frac{2}{3} + 2$$

$$x = \frac{2}{3} + \frac{6}{3}$$

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

Completing the Square:

$$\textcircled{a} \text{ h) } -9 = -4x^2 - 2x$$

$$4x^2 + 2x - 9 = 0$$

$$\frac{4x^2}{4} + \frac{2x}{4} = \frac{9}{4}$$

$$x^2 + \frac{1}{2}x + \frac{1}{16} = \frac{9}{4} + \frac{1}{16} \quad * \frac{1}{2} \times \frac{1}{2} = \left(\frac{1}{4}\right)^2 = \frac{1}{16}$$

$$\left(x + \frac{1}{4}\right)^2 = \frac{36}{16} + \frac{1}{16}$$

$$\left(x + \frac{1}{4}\right)^2 = \frac{37}{16}$$

Square Root Both sides

$$x + \frac{1}{4} = \pm \sqrt{\frac{37}{16}}$$

$$x = -\frac{1}{4} \pm \frac{\sqrt{37}}{4}$$

$$x = -\frac{1}{4} - \frac{\sqrt{37}}{4}$$

$$x = -\frac{1}{4} + \frac{\sqrt{37}}{4}$$

$$x = \frac{-1 - \sqrt{37}}{4}$$

$$x = \frac{-1 + \sqrt{37}}{4}$$

$$x = \frac{-7.08}{4}$$

$$x = \frac{5.08}{4}$$

$$x = -1.77$$

$$x = 1.27$$

Factoring

$$\textcircled{1} \text{ f) } \underline{3}m^2 - 10m + \underline{3} = 0$$

$$(3m^2 - 1m)(-9m + 3) = 0$$

$$m(3m-1) - 3(3m-1) = 0$$

$$(3m-1)(m-3) = 0$$

$$\begin{array}{l|l} 3m-1=0 & m-3=0 \\ 3m=1 & m=3 \\ m=\frac{1}{3} & \end{array}$$

$$\begin{array}{l} -1 \times -9 = 9 \\ -1 + -9 = -10 \end{array}$$

$$\begin{array}{l} 9 \\ -1 \times 9 \\ 3 \times 3 \end{array}$$

Review #3

$$\text{a) j) } x^2 - 4 = 0$$

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

$$\begin{array}{l|l} x+2=0 & x-2=0 \\ x=-2 & x=2 \end{array}$$

$$\text{k) } 4x^2 - 25 = 0$$

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

$$\begin{array}{l|l} 2x+5=0 & 2x-5=0 \\ 2x=-5 & 2x=5 \\ x=-\frac{5}{2} & x=\frac{5}{2} \end{array}$$

$$\text{Ex. } (x+2)^2 - 16 = 0$$

$$(x+2+4)(x+2-4) = 0$$

$$(x+6)(x-2) = 0$$

$$\begin{array}{l|l} x+6=0 & x-2=0 \\ x=-6 & x=2 \end{array}$$

$$\textcircled{4} \text{ b) } \underline{2}x^2 - \underline{3}x + \underline{2} = 0$$

$$a=2 \quad b=-3 \quad c=2$$

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

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

$$x = \frac{3 \pm \sqrt{9-16}}{4}$$

$$x = \frac{3 \pm \sqrt{-7}}{4}$$

← Imaginary Roots

$$x = \frac{3 \pm \sqrt{7i^2}}{4}$$

$$x = \frac{3 \pm i\sqrt{7}}{4}$$