Solving Quadratic Equations Review

August 30, 2014   3:21 PM

A. Things to Know

1. Factoring Polynomials
2. Solving Quadratic Equations by Factoring
3. Solving Quadratic Equations by Completing the Square
4. Solving Quadratic Equations by Quadratic Formula
5. The Discriminant and Nature of the Roots

B. Examples

1. Factor the following completely.

a) $75a^2b - 48b^3$

$3b(25a^2 - 16b^2)$

$\boxed{3b(5a+4b)(5a-4b)}$

b) $18m^3 + 12m^2 + 2m$

$2m(9m^2 + 6m + 1)$

$\boxed{2m(3m+1)(3m+1)}$ or $2m(3m+1)^2$

c) $(2x - 5y)^2 + 5(2x - 5y) + 6$ $a = (2x-5y)$

$a^2 + 5a + 6$

$(a+3)(a+2)$

$((2x-5y)+3)((2x-5y)+2)$

$\boxed{(2x-5y+3)(2x-5y+2)}$

d) $3x^2 + \frac{5}{2}x + \frac{1}{2}$

$\frac{1}{2}(6x^2 + 5x + 1)$

$\boxed{\frac{1}{2}(3x+1)(2x+1)}$

2. Solve the following quadratic equations by factoring.

a) $x^2 - 2x - 8 = 0$

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

$x - 4 = 0 \qquad x + 2 = 0$
$\;\;+4 \;\;+4 \qquad\quad -2 \;\;-2$

$\boxed{x = 4, -2}$

b) $x^2 = -\frac{7}{2}x - 3$
$\;+\frac{7}{2}x + 3 \qquad +\frac{7}{2}x \;\; +3$

$x^2 + \frac{7}{2}x + 3 = 0$

$\frac{1}{2}(2x^2 + 7x + 6) = 0$

$\frac{1}{2}(2x+3)(x+2) = 0$

$2x + 3 = 0 \qquad x + 2 = 0$
$\;\; -3 \;\; -3 \qquad\quad -2 \;\; -2$

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

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

3. Solve the following quadratic equations by completing the square.

a) $x^2 - 5x - 8 = 0$
$\qquad +8 \quad +8$

$x^2 - 5x = 8$

$x^2 - 5x + \frac{25}{4} = 8 + \frac{25}{4}$

$\pm\sqrt{\left(x - \frac{5}{2}\right)^2} = \pm\sqrt{\frac{57}{4}}$

$x - \frac{5}{2} = \frac{\pm\sqrt{57}}{2}$
$\quad +\frac{5}{2} \quad +\frac{5}{2}$

$x = \frac{5}{2} \pm \frac{\sqrt{57}}{2}$

$\boxed{X = \frac{5 \pm \sqrt{57}}{2}}$

b) $2x^2 - 10x - 20 = 4x^2 + 6x$
$\quad -4x^2 - 6x \qquad -4x^2 - 6x$

$-2x^2 - 16x - 20 = 0$
$\qquad\qquad +20 \quad +20$

$-2(x^2 + 8x) = 20$

$-2(x^2 + 8x + 16) = 20 - 32$

$-2(x+4)^2 = -12$
$\overline{-2} \qquad\qquad \overline{-2}$

$\pm\sqrt{(x+4)^2} = \pm\sqrt{6}$

$x + 4 = \pm\sqrt{6}$
$\quad -4 \qquad -4$

$\boxed{X = -4 \pm \sqrt{6}}$

4. Solve the following using the quadratic formula.

$x^2 + 4x - 1 = 0 \qquad a = 1, b = 4, c = -1$

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

$= \frac{-(4) \pm \sqrt{(4)^2 - 4(1)(-1)}}{2(1)}$

$= \frac{-4 \pm \sqrt{20}}{2} \qquad \sqrt{4 \cdot 5}$

$= \frac{(-4) \pm (2)\sqrt{5}}{(2)} \quad \substack{\div 2 \\ \div 2}$

$= \boxed{-2 \pm \sqrt{5}}$

5. Solve the following using the quadratic formula. Round your answer to nearest hundredth.

$2x^2 - 6x + 1 = 0 \qquad a = 2, b = -6, c = 1$

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

$= \frac{-(-6) \pm \sqrt{(-6)^2 - 4(2)(1)}}{2(2)}$

$= \frac{6 \pm \sqrt{28}}{4}$

$= \frac{6 + \sqrt{28}}{4} , \quad \frac{6 - \sqrt{28}}{4}$

$\boxed{X = 2.82 , 0.18}$

6. Determine the value of the discriminant and where there are one, two or no real roots.

a) $4x^2 - 5x + 3 = 0 \qquad b^2 - 4ac$
$a = 4, b = -5, c = 3 \quad (-5)^2 - 4(4)(3) = \boxed{-23} \qquad \boxed{\text{No Real Roots}}$

b) $4x^2 + 8x + 4 = 0 \qquad b^2 - 4ac$
$a = 4, b = 8, c = 4 \quad (8)^2 - 4(4)(4) = \boxed{0} \qquad \boxed{\text{One Root}}$

c) $4x^2 - 6x - 1 = 0 \qquad b^2 - 4ac$
$a = 4, b = -6, c = -1 \quad (-6)^2 - 4(4)(-1) = \boxed{52} \qquad \boxed{\text{Two Root}}$

Assignment: Pg. 242 #1 - 11