Lesson Notes 2-3 **The Quadratic Formula**

Occasionally you will be asked to solve quadratic equations that are not factorable expressions. Also, you will be asked for "exact answers" to quadratic equations with decimal roots (or solutions). In other words, the answer must be expressed in simplified radical form. Let's brush up on our radical skills…

Simplify these radicals:

1) $\sqrt{44}$ $= \sqrt{2 \cdot 2 \cdot 11} = 2\sqrt{11}$

(2) $2\sqrt{1800}$ $= 2\sqrt{2 \cdot 2 \cdot 2 \cdot 3 \cdot 3 \cdot 5 \cdot 5} = 60\sqrt{2}$

3) $\dfrac{8 \pm \sqrt{24}}{6} = \dfrac{8 \pm \sqrt{2 \cdot 2 \cdot 2 \cdot 3}}{6} = \dfrac{8 \pm 2\sqrt{6}}{6} = \dfrac{4 \pm \sqrt{6}}{3}$

(4) $\dfrac{-4 \pm \sqrt{32}}{12} = \dfrac{-4 \pm \sqrt{2 \cdot 2 \cdot 2 \cdot 2 \cdot 2}}{12} = \dfrac{-4 \pm 4\sqrt{2}}{12} = \dfrac{-1 \pm \sqrt{2}}{3}$

**The Quadratic Formula**

Given $ax^2 + bx + c = 0$, $\quad x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

**Example 1:** Find exact, simplified radical answers to these quadratic equations:

a) $2x^2 - 13x + 10 = 0$ $\quad a=2,\ b=-13,\ c=10$

$x = \dfrac{-(-13) \pm \sqrt{(-13)^2 - 4(2)(10)}}{2(2)} = \dfrac{13 \pm \sqrt{89}}{4}$

(b) $.3x^2 + .2x + .6 = 0$ $\quad \times 10$

$3x^2 + 2x + 6 = 0$

$x = \dfrac{-(2) \pm \sqrt{2^2 - 4(3)(6)}}{2(3)} = \dfrac{-2 \pm \sqrt{-68}}{6}$ no solution

c) $5x^2 + 6x = 1$

$5x^2 + 6x - 1 = 0$

$x = \dfrac{-6 \pm \sqrt{(6)^2 - 4(5)(-1)}}{2(5)} = \dfrac{-6 \pm \sqrt{56}}{10} = \dfrac{-6 \pm 2\sqrt{14}}{10} = \dfrac{-3 \pm \sqrt{14}}{5}$