Complex Trinomials

- Not all trinomials are simple, sometimes the standard form equation has an a value that cannot be common factored out, i.e. $y = 3x^2 + 7x + 2$. These types of expressions are called complex trinomials.

- To factor a complex trinomial we use a process called decomposition, which breaks the trinomial into two parts:
  1) Multiply the first and third terms together.
  2) Find 2 values that multiply to this new term and add to the middle term.
  3) Replace the middle term with the 2 values calculated.
  4) Split the expression in half and common factor each half.
  5) Common factor again.

Ex/ Factor.

a) $2x^2 + 13x + 6$ (Add to 13, multiply to 12)

Split in half, common factor each half

$= 2x^2 + 12x + 1x + 6$ (same sign)

$= 2x(x+6) + 1(x+6)$

$= (x+6)(2x+1)$

common bracket; remaining terms

b) $4x^2 + 4x + 1$

$= 4x^2 + 2x + 2x + 1$

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

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

c) $5x^2 - 22x + 8$

$= 5x^2 - 20x - 2x + 8$

$= 5x(x-4) - 2(x-4)$

$= (x-4)(5x-2)$

Ex/ Given $y = 4x^2 - 8x - 5$ determine:

a) The direction of opening.
b) The vertex.
c) The zeros.
d) The y-intercept.

a) up (positive 4)

b) $x = \frac{8}{2(4)} = \frac{8}{8} = 1$ $\quad y = 4(1)^2 - 8(1) - 5$

$= -9$

Vertex $(1, -9)$

d) when $x = 0$, $y = -5$

c) $y = 4x^2 - 10x + 2x - 5$

$= 2x(2x-5) + 1(2x-5)$

$= (2x-5)(2x+1)$

* figure out what makes each bracket equal zero.

$2x - 5 = 0$

$2x = 5$

$x = 5/2$

$= 2.5$

$2x + 1 = 0$

$2x = -1$

$x = -1/2$

$x = -0.5$

Homework: Pg. 223 #'s: 5,13