8.5
Factor $x^2 + bx + c$

Review:

- Multiplying two binomials results in a trinomial.
  - EX: $(3x + 2)(x - 4)$ ← binomials

    $3x^2 - 12x + 2x - 8$

    $3x^2 - 10x - 8$ ← trinomial

- Therefore, we will factor a trinomial into two binomials.

To factor a polynomial:

- Step 1: Look for a common monomial.
- Step 2: If you have a trinomial, factor it into two binomials.
  - The 1st terms in each binomial must multiply to get the 1st term in the trinomial.
  - The 2nd term in each binomial must add to get the 2nd terms coefficient in the trinomial and must multiply to get the 3rd term in the trinomial.
  - NOTE: Pay attention to signs (+/−).

NOTEBOOK EXAMPLE #1

EX: Factor the trinomial.

- $x^2 + 3x + 2$ $(x+1)(x+2)$
- $t^2 + 9t + 14$ $(t+7)(t+2)$
- $x^2 - 4x + 3$ $(x-1)(x-3)$
- $t^2 - 8t + 12$ $(t-6)(t-2)$
- $m^2 + m - 20$ $(m+5)(m-4)$
- $w^2 + 6w - 16$ $(w+8)(w-2)$
- $x^2 - 4xy + 4y^2$ $(x-2y)(x-2y)$
- $m^2 - mn - 42n^2$ $(m-7n)(m+6n)$

Think: What multiplies to get x^2:
x and x
What multiplies to get 2
but adds to get 3:
1 and 2

☆ FOIL to check:
$(x+1)(x+2)$
$x^2+2x+1x+2$
x^2+3x+2 ✓

NOTEBOOK EXAMPLE #2

EX: Solve the equation (by factoring).

- $x^2 - 2x = 24$
- $x^2 - 2x - 8 = 7$
- $s(s + 1) = 72$

$* \; x^2 - 2x = 24$

$-24 \quad -24$

$x^2 - 2x - 24 = 0$

$(x - 6)(x + 4) = 0$

$x - 6 = 0 \quad +6 \; +6 \qquad x = 6$

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

$* \; x^2 - 2x - 8 = 7$

$-7 \quad -7$

$x^2 - 2x - 15 = 0$

$(x - 5)(x + 3) = 0$

$x - 5 = 0 \quad +5 \; +5 \qquad x = 5$

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

$* \; s(s+1) = 72$

$s^2 + s = 72$

$-72 \quad -72$

$s^2 + s - 72 = 0$

$(s + 9)(s - 8) = 0$

$s + 9 = 0 \quad -9 \; -9 \qquad s = -9$

$s - 8 = 0 \quad +8 \; +8 \qquad s = 8$