6.2: Factoring Trinomials (cont'd) — 6.2.2

Note Title 3/21/2018

will leading coefficient 1

Example: Factor.

$x^2 + 16x - 36$ ← (−) signs are opposite

$= (x - 2)(x + 18)$

Check:
- in standard form
- GCF factored out
- leading term positive

Check: $x^2 + 18x - 2x - 36$

$x^2 + 16x - 36$ ✓

36
∧
1 · 36
2 · 18
3 · 12
4 · 9
6 · 6

signs are opposite, so we want a difference of 16

also correct: $(x + 18)(x - 2)$

Ex: Factor.

$a^2 - 13a - 30$ ← (−) signs are opposite

$(a + 2)(a - 15)$

signs opposite, so I want a difference of 13

30
∧
1 · 30
2 · 15
3 · 10
5 · 6

Check: $a^2 - 15a + 2a - 30$

$= a^2 - 13a - 30$ ✓

Ex: $x^2 + 12x + 36$ ← (+) signs are the same

$(x + 6)(x + 6)$

signs are the same, so I want a sum of 12

36
∧
1 · 36
2 · 18
3 · 12
4 · 9
6 · 6

Check: $x^2 + 6x + 6x + 36$

$= x^2 + 12x + 36$ ✓

$(x + 6)^2$

Ex: Factor

$x^2 - 17x + 16$ (+) signs the same

$(x - 1)(x - 16)$

signs the same, so I want 2 sum of 17

16
1, 16
2, 8
4, 4

Check: $x^2 - 16x - 1x + 16$

$= x^2 - 17x + 16$ ✓

Ex: $x^2 - 3x - 54$ (-) signs are opposite

$(x + 6)(x - 9)$

signs opposite, so I want a difference of 3

54
1, 54
2, 27
3, 18
6, 9

Check: $x^2 - 9x + 6x - 54$

$x^2 - 3x - 54$ ✓

Ex: $x^2 + 7x - 12$ (-) signs are opposite want a difference of 7

12
1, 12
2, 6
3, 4

Try: $(x - 3)(x - 4)$

Check: $x^2 - 4x - 3x + 12$

$x^2 - 7x + 12$ No!

Try $(x - 3)(x + 4)$

$x^2 + 4x - 3x - 12$

$x + x - 12$ No!

this polynomial cannot be factored. This polynomial is prime.

6.2.4

Recall:

Prime number: counting number that can only be factored as a product of 1 and itself.

Ex: 5 is prime

$5 \cdot 1 = 5$

Ex: 6 is not prime (it's composite)

$6 = 2 \cdot 3$

Prime polynomial: can only be factored (using integer coefficients) by factoring out 1 or -1.

Ex: Factor $x^2 - 11xy - 12y^2$

(-) signs opposite → want a difference of 11

$(x + 1y)(x - 12y)$

12
1 · 12
2 · 6
3 · 4

Check: $x^2 - 12xy + 1xy - 12y^2$

$x^2 - 11xy - 12y^2$

$\boxed{(x+y)(x-12y)}$

Very similar to: $x^2 - 11x - 12$

Ex: $2x^2 + 18x + 28$

GCF: 2

$= 2(x^2 + 9x + 14)$

(+) signs the same, so I want a sum of 9

$= 2[(x+2)(x+7)]$

14
1 · 14
2 · 7

$= \boxed{2(x+2)(x+7)}$

or $\boxed{2(x+7)(x+2)}$

Check: $(x+2)(x+7)$

$= x^2 + 7x + 2x + 14$ ✓

$= x^2 + 9x + 14$

Ex: $-x^2 + 14x - 40$

$= -1(x^2 - 14x + 40)$ [Factor out -1]

$= -1[x^2 - 14x + 40]$ (+) same signs, so want a sum of 14

$= -1[(x-4)(x-10)]$

$= -1(x-4)(x-10)$

$= \boxed{-(x-4)(x-10)}$

Check $(x-4)(x-10)$

$= x^2 - 10x - 4x + 40$

$= x^2 - 14x + 40$ ✓

40
1 · 40
2 · 20
4 · 10
5 · 8