2.1 notes

Wednesday, January 29, 2020 5:13 PM

Pre-Calc 11

2.1 Review of Factoring

Terminology

Monomial – is a single term which can include numbers, variables or both.

Ex: 3 , x^2 , $4x^2y^3$

Binomial – is two terms, or two monomials separated with a **sign**.

Ex: $x+3$, $2x^2-1$, x^2-4 , $2x^3y^2-5x^4$

Trinomial – is three terms, or three monomials separated by **signs**.

Ex: x^2-5x-6 , $6x^2-13x+6$, $4x^3y+6x^2-3xy$

Polynomial – is all of the above. or a 4+ termed expression.

A. GCF of a Polynomial:

What to ask yourself to find the GCF:

Number

1. What is the largest Number that Divides evenly into **ALL** the terms? Ex: 18 , 24 , 36 $GCF =$ 6

Variable

2. What variable (s) appears in **ALL OF THE TERMS** and what is the lowest **exponent** of each of these variables?

Ex: x^3y , x^2z , $x^4y^2z^3$ $GCF =$ x^2

xxxy , xxz , xxxxyyzzz

leading term determines the sign on GCF

Example 1: Factor each polynomial.

a) $\frac{6x^2}{3x^2} - \frac{15x^3}{3x^2}$

$= 3x^2(2-5x)$

GCF ; what's left over after you divide out GCF

b) $\frac{24x^2y^3}{6x^2y} - \frac{18x^3y}{6x^2y}$

$= 6x^2y(4y^2-3x)$

expanding produced the original polynomial:

$6x^2y(4y^2-3x)$

$= 24x^2y^3 - 18x^3y$

c) $\frac{-3x^3}{-3x} - \frac{9x^2}{-3x} + \frac{12x}{-3x}$

$= -3x(x^2+3x-4)$

B. GCF and Factor by Grouping

If there is no common factor between all of the terms of a polynomial, then we can use the Grouping Method. We can use this method whenever a common factor exists between groups of terms.

Example 2:

a) $3x(x+5)+2(x+5)$

$=(x+5)(3x+2)$

GCF — left overs

b) $4x(2x-3)-(2x-3)$

$=(2x-3)(4x-1)$

c) $2x^2+8x+3x+12$

$=2x(x+4)+3(x+4)$

$=(x+4)(2x+3)$

d) $2x^2+3x+8x+12$

$=x(2x+3)+4(2x+3)$

$=(2x+3)(x+4)$

C. Factoring Simple Trinomials (Polynomials of the form ax^2+bx+c) where $a=1$

- Find the numbers that multiply to (c) and add to (b)

Example 2: Factor fully each trinomial .

a) x^2+5x+6 $\quad a=1\ b=5\ c=6$ $\quad 2+3=5$ $\quad 2\cdot 3=6$

$=(x+2)(x+3)$

or... $(x+3)(x+2)$

→ order doesn't matter in multiplication

b) f^2-2f-8

$=(f+2)(f-4)$

$2+-4=-2$

$2\cdot -4=-8$

$-1\cdot 8$, $-2\cdot 4$, $1\cdot -8$, $2\cdot -4$

check by expanding

c) $-a^2-19a+20$

$=-1(a^2+19a-20)$

$=-1(a-1)(a+20)$

$-+-=19$

$-\cdot -=-20$

d) $-4x^2-16x+128$

$=-4(x^2+4x-32)$

$=-4(x+8)(x-4)$

D. Factoring Complex Trinomials (Polynomials of the form $ax^2 + bx + c$) where $a \neq 1$

To factor trinomials of the form: $ax^2 + bx + c$ when $a \neq 1$ is called: **FACTORING BY DECOMPOSITION (rainbow split)**

- Find the numbers that multiply to $(a \cdot c)$ and add to (b)
- Split the middle term into these two factors
- Factor by grouping

① rainbow
② puzzle
③ split
④ group
⑤ answer.

Example 3: Factor each trinomial. Check your answer by expanding.

a) $6x^2 + 17x + 5$

① 30 ② $15 + 2 = 17$, $15 \cdot 2 = 30$

$= (6x^2 + 15x + 2x + 5)$ ③

$= 3x(2x+5) + 1(2x+5)$ ④

$= (2x+5)(3x+1)$ ⑤

b) $2x^2 - 5x - 3$

-6 $-6 + 1 = -5$, $-6 \cdot 1 = -6$

$= (2x^2 - 6x + 1x - 3)$

$= 2x(x-3) + 1(x-3)$

$= (x-3)(2x+1)$

c) $12x^2 + 7x + 1$

12 $3 + 4 = 7$, $3 \cdot 4 = 12$

$= (12x^2 + 3x + 4x + 1)$

$= 3x(4x+1) + 1(4x+1)$

$= (4x+1)(3x+1)$

d) $\frac{6a^2}{2} + \frac{20a}{2} - \frac{16}{2}$

$12 + -2 = 10$, $12 \cdot -2 = -24$

$= 2(3a^2 + 10a - 8)$ (-24)

$= 2(3a^2 + 12a - 2a - 8)$

$= 2(3a(a+4) - 2(a+4))$

$= 2(a+4)(3a-2)$

* If you forget the GCF = 2, you get $(\frac{2a}{2} + \frac{8}{2})(3a-2)$

$= 2(a+4)(3a-2)$

↑ pull GCF out at end.

* always check factors cannot be factored further.

HW: 2.1 WS