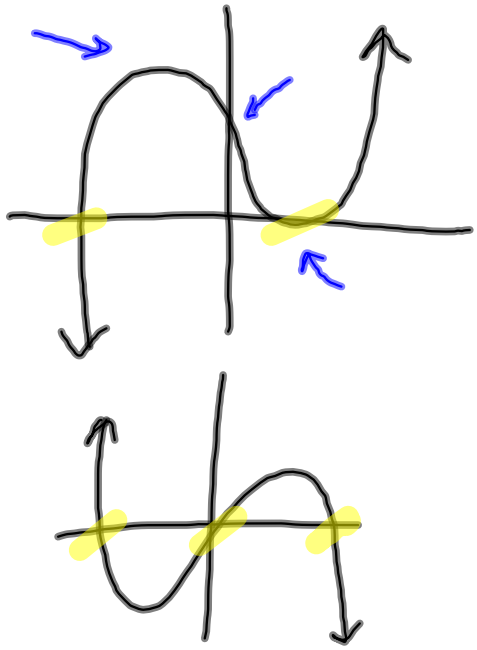
SCIENTISTS SAY WE USE ONLY 10% OF OUR BRAINS. IMAGINE HOW GREAT THE WORLD WOULD BE IF WE USED THE OTHER 60% TOO.

Polynomials



Zeros
multiplicity
turning pts.
end behavior

Polynomials

- A polynomial is a function of the form:

$f(x)=a_nx^n + a_{n-1}x^{n-1}+\ldots\ldots +a_1x + a_0$

where $a_n \neq 0$, the exponents are whole numbers, and the coefficients are all real numbers.

Ex: $x^3 + 2x^2 + x - 1$

$$a_n x^n + \ldots\ldots + a_0$$

leading coefficient

constant

- The leading coefficient is a_n
- The constant is a_0
- The degree of the function is n (highest exponent)
- Standard form: exponents are in descending order

✓ $2x^2+5x-8$

✗ $5\sqrt{x}-3x^2+8$
$(5x^{1/2}-3x^2+8)$

✗ $5x^{-3}+8x-11$

✓ 6
$(6x^0)$

Classify Polynomials

degree	terms
0: constant ($6x^0$) 1: linear ($3x+5$) 2: Quadratic ($4x^2-x+2$) 3: Cubic 4: Quartic ↓ Nth degree	1: monomial 2: binomial 3: trinomial ↓ Polynomials

Polynomials
- 6
- $3x+2$
- $8x^7+5x^4-3x^3+x-15$

add: $(5x^3-7x^2-3)+(x^3+2x^2-x+8)$

$6x^3-5x^2-x+5$

find: $(6x-5)^3 = (6x-5)(6x-5)(6x-5)$

$(6x-5)(36x^2-60x+25)$

$216x^3-360x^2+150x-180x^2+300x-125$

$216x^3-540x^2+450x-125$

multiply: $(x+y-2)(x+y+2)$

find: $(2x-1)(x+3)+3(x+3)$

(FACT)(ORING)

Factoring: the process of writing a polynomial as a product of factors.

If a polynomial cannot be factored using integer coefficients, then it is **prime** or **irreducible over the integers.**

Factoring special polynomials:

Sum or difference of two cubes:

$$u^3 + v^3 = (u + v)(u^2 - uv + v^2)$$

same — opp. — always pos.

$$u^3 - v^3 = (u - v)(u^2 + uv + v^2)$$

SOAP

a) $x^3 - 27 = (x-3)(x^2+3x+9)$

$9-4(1)(9)$

$x \quad 3$

$x^3 + 3x^2 + 9x - 3x^2 - 9x - 27$

b) $y^3 + 64 = (y+4)(y^2-4y+16)$

c) $3a^3 + 192 = 3(a^3+64)$

$= 3(a+4)(a^2-4a+16)$

Factor by grouping:

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

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

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

$(a^3 + 5a^2)(- 5a - 25)$

$a^2(a+5) - 5(a+5)$

$\boxed{(a+5)(a^2-5)}$

$$(8v^5 - 6v^2 + 12v^3 - 9)$$

$$2v^2(4v^3 - 3) + 3(4v^3 - 3)$$

$$\boxed{(4v^3 - 3)(2v^2 + 3)}$$

Write in standard form.

$10x^2 + 9x^4 + 16 + 17x$

2 1 0 3

- a. $9x^4 + 10x^2 + 17x + 16$
- b. $9x^4 + 0x^3 + 10x^2 + 17x + 16 = 0$
- c. $9x^4 + 0x^3 + 10x^2 + 17x + 16$
- d. None of the above.

Find the difference. $4x^4 + 3x^2 - 9x - 1$

$(8x^4 + 5x^2 - 5x - 1) - (4x^4 + 2x^2 + 4x)$

- a. $4x^4 + 3x^2 - x - 1$
- b. $4x^4 + 7x^2 - 9x - 1$
- c. $-x^4 + 3x^2 - 9x - 1$
- d. None of the above.

Multiply.

$(6x + 4)(x^3 + 9x^2 - x - 4)$

$6x^4 + 54x^3 - 6x^2 - 24x$

$4x^3 + 36x^2 - 4x - 16$

$6x^4 + 58x^3 + 30x^2 - 28x - 16$

a. $6x^4 + 58x^3 - 30x^2 - 28x + 16$

b. $4x^3 + 9x^2 + 5x - 4$

c. $6x^4 + 58x^3 + 30x^2 - 28x - 16$

d. None of the above.

Find $(5x+4)^3$ $(5x+4)(5x+4)(5x+4)$

$(5x+4)(25x^2+40x+16)$

a. $125x^3 + 300x^2 + 240x + 64$

b. $125x^3 + 200x^2 + 160x + 64$

c. $125x^3 + 540x^2 + 64$

d. None of the above.

$125x^3 + 200x^2 + 80x$

$100x^2 + 160x + 64$

$125x^3 + 300x^2 + 240x + 64$

Factor.

$a^3 - 216$ $= (a-6)(a^2+6a+36)$

$a \quad b$

- a. $(a+6)(a^2-6a+36)$
- b. $(a-6)(a^2+6a+36)$
- c. $(a-6)(a+6)$
- d. None of the above.

Factor.

$8a^3 + 27b^3$ $= (2a+3b)(4a^2 - 6ab + 9b^2)$

$2a$ $3b$

- a. $(2a + 3b)(4a^2 + 6ab + 9b)$
- b. $(2a + 3b)(4a^2 - 6ab - 9b)$
- c. $(2a + 3b)(2a - 27b)$
- d. None of the above.

HW:

Pg 29 #1-49 by 3's, 91, 104

Pg 38 #39, 44, 46, 65, 68, 71, 111