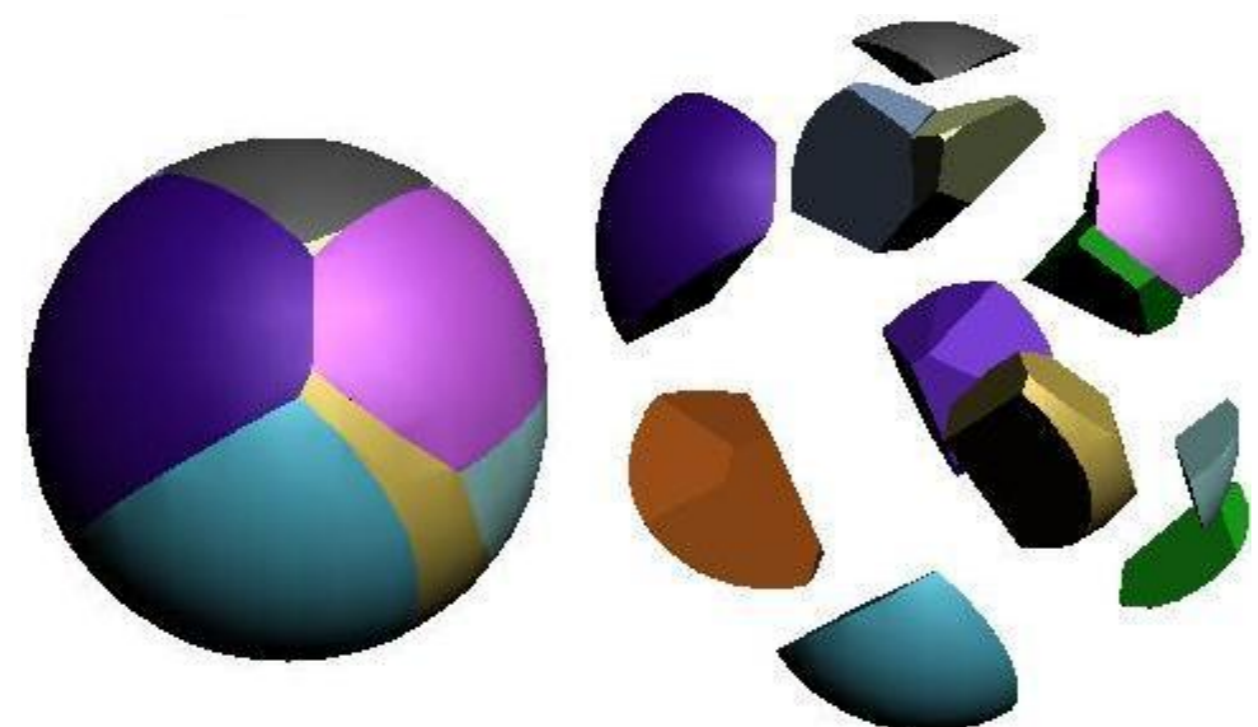


Разбиение отдельных членов на слагаемые
(как буквенных, так и числовых)

- 1) $x^3 + 1991x + 1992 = 0$
- 2) $x^3 - 3x^2 + 2 = 0$
- 3) $x^4 - x^3 - 13x^2 + x + 12 = 0$
- 4) $x^3 + 4x^2 - 5 = 0$
- 5) $x^4 - x^3 - 7x^2 + x + 6 = 0$



$$(a^3+b^3)=(a+b)(a^2-ab+b^2)$$

$$x^5-3x+1=0$$

$$x^4 - x^3 - 13x^2 + x + 12 = 0$$

$$x^4 - x^3 - 12x^2 - x^2 + x + 12 = 0$$

$$-12(x^2-1) + x^3(x-1) - x(x-1) = 0$$

$$-12(x-1)(x+1) + x^3(x-1) - x(x-1) = 0$$

$$(x-1)(-12(x+1) + x^3 - x) = 0$$

$$0 \text{ or } 0$$

$$x = 1$$

$$(-12(x+1) + x^3 - x) = 0$$

$$-12(x+1) + x(x^2-1) = 0$$

$$-12(x+1) + x(x-1)(x+1) = 0$$

$$(x+1)(-12 + x(x-1)) = 0$$

$$0 \text{ or } 0$$

$$x = -1$$

$$-12 + x(x-1) = 0$$

$$x^2 - x - 12 = 0$$

$$x_1 x_2 = -12$$

$$x_1 + x_2 = 1$$

$$4 - 3$$

$$\text{answer : } -1 : 1 : 4 : -3$$

$$5) x^4 - x^3 - 7x^2 + x + 6 = 0$$

$$x^4 - x^3 - 6x^2 - x^2 + x + 6 = 0$$

$$(x^3)(x-1) - 6(x^2-1) - x(x-1) = 0$$

$$(x^3)(x-1) - 6(x-1)(x+1) - x(x-1) = 0$$

$$(x-1)(x^3 - 6(x+1) - x) = 0$$

$$0 \text{ or } 0 \Rightarrow (x=1)$$

$$(x^3 - 6(x+1) - x) = 0$$

$$x(x^2-1) - 6(x+1) = 0$$

$$x(x+1)(x-1) - 6(x+1) = 0$$

$$(x+1)(x(x-1) - 6) = 0$$

$$0 \text{ or } 0$$

$$x = -1$$

$$(x(x-1) - 6) = 0$$

$$x^2 - x - 6 = 0$$

$$x_1 x_2 = -6$$

$$x_1 + x_2 = 1$$

$$3 - 2$$

$$\text{answer : } -1; 3; -2; 1$$

$$4) x^3 + 4x^2 - 5 = 0$$

$$x^3 + 5x^2 - x^2 - 5 = 0$$

$$5(x^2-1) + x^2(x-1) = 0$$

$$5(x-1)(x+1) + x^2(x-1) = 0$$

$$(x-1)(5x+5 + x^2) = 0$$

$$0 \text{ or } 0$$

$$x=1$$

$$x^2 + 5x + 5 = 0$$

$$D = 25 - 20 = 5$$

$$x_1 = \frac{-5 - \sqrt{5}}{2} = \frac{-5 - \sqrt{5}}{2}$$

$$x_2 = \frac{-5 + \sqrt{5}}{2}$$

$$\text{answer : } \frac{-5 - \sqrt{5}}{2}; \frac{5 + \sqrt{5}}{2}; 1$$

$$2) x^3 - 3x^2 + 2 = 0$$

$$x^3 - 2x^2 - x^2 + 2 = 0$$

$$-2(x^2-1) + x^2(x-1) = 0$$

$$-2(x-1)(x+1) + x^2(x-1) = 0$$

$$(x-1)(-2(x+1) + x^2) = 0$$

$$0 \text{ or } 0$$

$$x=1$$

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

$$x_1 x_2 = -2$$

$$x_1 + x_2 = 2$$

$$D^* = (b:2)^2 - ac = 1 - (-2) = 1 + 2 = 3$$

$$x_1 = 1 + \sqrt{3}$$

$$x_2 = 1 - \sqrt{3}$$

$$\text{answer : } 1 - \sqrt{3}; 1 + \sqrt{3}; 1$$

$$1) x^3 + 1991x + 1992 = 0$$

$$x^3 + 1992x - x + 1992 = 0$$

$$x(x^2-1) + 1992(x+1) = 0$$

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

$$x(x-1)(x+1) + 1992(x+1) = 0$$

$$(x+1)(x(x-1) + 1992) = 0$$

$$0 \text{ or } 0$$

$$x = -1$$

$$x(x-1) + 1992 = 0$$

$$x^2 - x + 1992 = 0$$

$$D = 1 - 4(1992) < 0$$

$$\text{no solutions}$$

$$\text{answer : } -1$$

$$1) x^3 + 1991x + 1992 = 0$$

$$x^3 + 1991x + 1991 + 1 = 0$$

$$(x^3+1) + 1991(x+1) = 0$$

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

$$(x+1)(x^2-x+1) + 1991(x+1) = 0$$

$$(x+1)(x^2-x+1 + 1991) = 0$$

$$0 \text{ or } 0$$

$$x = -1$$

$$x^2-x + 1992 = 0$$

$$\text{answer : } -1$$

$$ax^2+bx+c=0$$

$$(x + ?)^2 - ? = 0$$

$$(x + ?)^2 - \sqrt{?}^2 = 0$$

$$(x + ??)(x - ??) = 0$$

$$0 \quad 0$$

$$x = -?? \text{ or } x = +??$$