

# я с друзьями на алгебре

Некоторые более сложные примеры

Разложить на множители

$$1)(*) x^4 + 4 =$$

$$2)(*) 2bc + a^2 - b^2 - c^2 =$$

$$= -(-2bc + b^2 + c^2) + a^2 =$$

$$= -(b^2 - 2bc + c^2) + a^2 = -(b-c)^2 + a^2 = a^2 - (b-c)^2 =$$

$$(a-(b-c))(a+b-c) = (a-b+c)(a+b-c)$$

$$3)(*) x^4 - 21x^2 + 4 =$$

$$= x^4 - x^2 - 20x^2 + 4 =$$

$$(x^2)^2 - 20x^2 + 2^2 - x^2 =$$

$$= (x^2)^2 + 4x^2 + 2^2 - 21x^2 - 4x^2 =$$

$$= (x^2 + 2)^2 - 25x^2 = (x^2 + 2)^2 - (5x)^2 =$$

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

$$4)(**) x^3 + y^3 + z^3 - 3xyz = \dots$$

$$5)(*) (x + y + z)^3 - x^3 - y^3 - z^3 = \dots$$

$$6)(*) x^4 + x^2y^2 + y^4 =$$

$$= (x^2)^2 + x^2y^2 + (y^2)^2 =$$

$$= (x^2)^2 + 2(xy)^2 + (y^2)^2 - 2(xy)^2 + x^2y^2 =$$

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

$$= (x^2 + y^2)^2 - x^2y^2 = (x^2 + y^2)^2 - (xy)^2 =$$

$$= ((x^2 + y^2) - xy)((x^2 + y^2) + xy) =$$

$$= (x^2 + y^2 - xy)(x^2 + y^2 + xy)$$

$$7)(*) a^4 - 2a^3 + a^2 - 1 = \dots$$

$$8)(*) c^8 - c^4 - 2c^2 - 1 = \dots$$

$$9)(*) 8x^3 + y^3 + 6y^2 + 12y + 8 = \dots$$

$$x^4 + 4 = \underline{(x^2)^2 + 4x^2 + 2^2} - 4x^2 =$$

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

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



$$(x+y)^2 = x^2 + 2xy + y^2$$

$$(x-y)^2 = x^2 - 2xy + y^2$$

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

$$7) a^4 - 2a^3 + a^2 - 1 = (a^2)^2 - 2a^3 + a^2 - 1 =$$
$$= (a^2)^2 - 2a^3 + a^2 - 1 = (a^2 - a)^2 - 1 = (a^2 - a)^2 - 1^2 =$$

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

$$8) c^8 - c^4 - 2c^2 - 1 = (c^4)^2 - 2c^2 - (c^2)^2 - 1 =$$

$$= (c^4)^2 - ((c^2)^2 + 1) - 2c^2 =$$

$$= (c^4)^2 - ((c^2)^2 + 2c^2 + 1) =$$

$$= (c^4)^2 - (c^2 + 1)^2 = (c^4 - (c^2 + 1))(c^4 + (c^2 + 1)) =$$

$$= (c^4 - c^2 - 1)(c^4 + c^2 + 1)$$