

Problems of Polynomials

1) Calculate the following expressions:

a) $(7x^2 + 3x + 17) + (8x^3 + 2x^2 - 7x + 17)$

b) $(-x^2 - 4x - 2) - (-5x^2 - 5x + 11)$

c) $(15x^3 + 21x^2 + 27x + 11) + (x^2 + 13x)$

d) $(-7x + 24) - (28x^2 + 28)$

e) $(12x) + (-x^2 - 2x + 7)$

f) $(22x^2 + 6) - (25x^3 + 25x^2 + 1)$

2) Calculate the following expressions:

a) $(3x^2 - 1)^2 - (17x^3 + 4x^2 - x)$

b) $(2x) \cdot (-5x^2 + 8)$

c) $(8x + 6)^2$

d) $(8x^2 + 5)^2 + (17x^3 - 10x^2)$

e) $(2x - 3)^2 - (7x^2 + 10x)$

f) $(-4x + 6) \cdot (7x + 3)$

3) Calculate the development of the following powers of binomials:

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

b) $(2x^4 + 2x^3)^2$

c) $(x^3 + 6)^3$

d) $(5x^3 + 7x^2)^3$

e) $(8x^3 - 4x^2)^3$

f) $(4x + 1)^3$

4) Calculate the quotient and the remainder of the following divisions:

a) $(9x^6 + 57x^5 + 70x^4 - 17x + 14) : (3x^2 + 5x)$

b) $(-24x^5 - 35x^4 + 23x^3 + 30x^2 - 15x - 19) : (3x^2 + 4x)$

c) $(63x^6 + 21x^5 + 3x^4 - 16x^3 + 14x^2 + 57x + 41) : (7x^2 + 7x + 5)$

d) $(8x^5 + 34x^4 + 20x^3 + 18x^2 - 34x + 40) : (2x^2 + 2x + 2)$

e) $(32x^3 + 88x^2 + 71x + 39) : (8x^2)$

f) $(42x^4 + 46x - 20) : (6x^2)$

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5) Calculate quotient and remainder of the following divisions applying Ruffini's Rule (Synthetic division):

- a) $(13x^2 - 13x - 10) : (x - 2)$
- b) $(8x^4 - 6x^3 - 5x^2 + 12x - 72) : (x - 1)$
- c) $(11x^3 - 83x^2 - 34x + 29) : (x - 8)$
- d) $(-4x^3 + 46x^2 - 116x + 79) : (x - 8)$
- e) $(8x^4 - 17x^3 - 21x^2 + 8x - 19) : (x - 3)$
- f) $(-x^4 + 5x^3 + 97x^2 + 86x + 28) : (x + 7)$

6) Calculate the value of parameter h for which the following division is exact.

$$(-7x^4 + hx^3 - 12x^2 - 24x - 32) : (x - 4)$$

7) Calculate the value of parameter k for which the following division is exact.

$$(2x^2 + kx + 30) : (x + 5)$$

8) Calculate the value of parameter a for which the remainder of the following division is -22 .

$$(13x^5 + ax^4 - 11x^3 - 8x^2 + 3x - 19) : (x + 1)$$

9) Factorize the following polynomials finding their Greatest Common Factors:

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|-------------------------|-------------------------------------|
| a) $9x^2y^2 + 18x^2$ | b) $16u^5w^4 + 12u^6v^5w^5 + 12u^4$ |
| c) $7x^5 + 4yx$ | d) $2x^6y^3z^5 + 18x^4y^2 + 19x^3$ |
| e) $10u^2v^5w^4 + 3u^4$ | f) $17ab + 20cb^3a^2 + 8a^3b^3c^4$ |

10) Factorize the following polynomials:

- | | | |
|---------------------|---------------------|--------------------|
| a) $x^2 + 6x + 9$ | b) $x^2 - 8x + 16$ | c) $16x^8 - 25x^4$ |
| d) $x^2 + 10x + 25$ | e) $x^2 - 16x + 64$ | f) $9x^8 - 49x^4$ |

11) Factorize the following polynomials applying Ruffini's Rule (Synthetic division):

- a) $x^2 - 8x + 16$
- b) $x^4 + 4x^3 - 17x^2 - 110x - 150$
- c) $x^3 + 4x^2 - 4x - 16$
- d) $x^2 - 2x + 1$
- e) $x^2 - 2x - 3$
- f) $x^4 - 12x^3 + 53x^2 - 102x + 72$

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- 11) **a)** $(x - 4)^2$
 b) $(x^2 + 6x + 10)(x - 5)(x + 3)$
 c) $(x - 2)(x + 2)(x + 4)$
 d) $(x - 1)^2$
 e) $(x + 1)(x - 3)$
 f) $(x - 4)(x - 3)^2(x - 2)$