

-

6 2019

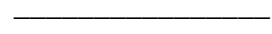
1,2
2,3

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30 2019

1



1.

1.	:

1.

2.

n-

4.

6.

1		20	8	4	4	4
2		10	2	2	2	4
3		37	16	8	8	5
4		14	6	2	2	4
5		27				27
		108	32	16	16	17+27

1		78	28	10	10	30
2		39	8	8	8	15
3.		27				27
		144	36	18	18	45+27

1.

2.

n-

3.

4.

5.

6.

7.

8.

9.

10.

11.

12. $n-$

13.

14.

15.

16.

1-2.

3-4.

5-6.

7-8.

9-10.

-12.

-14.

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R.

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Q

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n-

A

B

5.

a b?
A B?

A B?

n-

-

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$n^*m?$

t

B

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5.

$n^*m?$

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2.

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n

m

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- 1) $\langle N, - \rangle$; 2) $\langle Q, - \rangle$; 3) $\langle N, + \rangle$; 4) $\langle Q, + \rangle$; 5) $\langle R_+ \cup \{0\}, + \rangle$; 6) $\langle R_+, \cdot \rangle$;
 7) $\langle [1; +\infty), \cdot \rangle$; 8) $\langle Z, * \rangle \quad a * b = a + b + 18$;
 9) $\left\langle \left\{ \begin{pmatrix} x & 0 \\ 0 & y \end{pmatrix} \mid x, y \in R_+ \right\}, \cdot \right\rangle$;
 10) $\langle K, + \rangle \quad K$

7)

- 1) $\langle S_2, \circ \rangle$; 2) $\langle S_3, \circ \rangle$; 3) $\langle \{E, S_l\}, \circ \rangle$;
 4) $\langle \{f_1, f_2, f_3, f_4\}, \circ \rangle \quad f_1 = x, f_2 = \frac{x-1}{x+1}, f_3 = -\frac{1}{x}, f_4 = -\frac{x+1}{x-1}$.
 $\circ \quad S_2 \quad S_3$
 $S_l \quad l, E$

$a, b \quad c$

- 1) $(a+b) - c = a + (b-c)$;
 2) $(a+b) - (a+c) = b-c$;
 3) $(a+b) - c = a - (c-b)$;
 4) $(a-b) - c = (a-c) - b$;
 5) $c - (a+b) = (c-a) - b$.
 $a - b = a + (-b)$

$a \quad b$

$\langle A, * \rangle$

$a * x = b$

f

$$\begin{pmatrix} a & b \\ 0 & 0 \end{pmatrix} \quad a, b \in \mathbb{Z}$$

f

$$1) f\left(\begin{pmatrix} a & b \\ 0 & 0 \end{pmatrix}\right) = \frac{a}{b}; \quad 2) f\left(\begin{pmatrix} a & b \\ 0 & 0 \end{pmatrix}\right) = |a|; \quad 3) f\left(\begin{pmatrix} a & b \\ 0 & 0 \end{pmatrix}\right) = 3a.$$

$$f(x) = \cos x + i \sin x$$

$\text{Ker } f$

f

$$\begin{pmatrix} a & b \\ 0 & 0 \end{pmatrix} \quad a, b \in \mathbb{Z},$$

$n -$

$$\langle \{-1, 1\}, \cdot \rangle$$

$$a + b\sqrt{3}$$

$$a + bi$$

$$a + bi$$

$$a \quad b.$$

$$a \quad b.$$

$$a \quad b.$$

$x \quad y$

11) $[a, b]$

$$na = 0. \quad n \quad a$$
$$b + c \quad b \cdot c. \quad b \quad c$$

5.

- 1) $\{a + b\sqrt{7} \mid a, b \in \mathbb{Z}\}$; 2) $\{a + b\sqrt{7} \mid a, b \in \mathbb{Q}\}$;
- 3) $\{a + b\sqrt{2} + c\sqrt{3} \mid a, b, c \in \mathbb{Q}\}$; 4) $\{a + bi\sqrt{2} \mid a, b \in \mathbb{Z}\}$.

P?

$$\begin{pmatrix} a & b \\ -2b & a \end{pmatrix} \quad a, b \in \mathbb{R}$$

$$a + bi\sqrt{5} \quad a, b \in \mathbb{Q}$$

$$a + b\sqrt{2} \quad a, b \in \mathbb{Q}$$

Q.

$$f \quad \begin{pmatrix} a & b & 0 \\ 0 & c & 0 \\ 0 & 0 & d \end{pmatrix} \quad a, b, c, d \in R$$

$$\begin{pmatrix} x & y \\ 0 & z \end{pmatrix} \quad x, y, z \in R$$

$$1) f \left(\begin{pmatrix} a & b & 0 \\ 0 & c & 0 \\ 0 & 0 & d \end{pmatrix} \right) = \begin{pmatrix} a & b \\ 0 & d \end{pmatrix}; 2) f \left(\begin{pmatrix} a & b & 0 \\ 0 & c & 0 \\ 0 & 0 & d \end{pmatrix} \right) = \begin{pmatrix} a & b \\ 0 & c \end{pmatrix}?$$

$$f \quad \begin{pmatrix} a & b \\ -b & a \end{pmatrix} \quad a, b \in R$$

$\sqrt[3]{5}?$

$$f: z \rightarrow \bar{z}$$

$\mathbb{Q}[\sqrt{3}] \quad \mathbb{Q}[\sqrt{7}]$

φ φ **P** **F** **P**

9. $= \langle K, +, \cdot \rangle$
 $\varphi(n) = ne$

e

φ

$K?$

1.

$$2x^4 - 3x^3 + 4x^2 - 5x + 6 \quad x^2 - 3x + 1;$$

$$x^3 - 3x^2 - x - 1 \quad 3x^2 - 2x + 1.$$

$$x^3 + px + q$$

$$x^2 + mx - 1?$$

$$x^4 + x^3 - 3x^2 - 4x - 1 \quad x^3 + x^2 - x - 1;$$

$$x^5 + x^4 - x^3 - 2x - 1 \quad 3x^4 + 2x^3 + x^2 + 2x - 2;$$

$$x^6 - 7x^4 + 8x^3 - 7x + 7 \quad 3x^5 - 7x^3 + 3x^2 - 7.$$

$$x^4 - x^3 + 2x - 2 \quad x^3 - 3;$$

$$x^5 + x^4 + 1 \quad x^4 + 1;$$

$$3x^3 - 2x^2 + x + 2 \quad x^2 - x + 1.$$

- 1.
- 2.
- 3.

$$x = 0, x = -1$$

$$f(x) = x^3 + 2x^2 + x,$$

$f(x_0)$:

$$f(x) = x^5 - 4x^3 + 6x^2 - 8x + 10, x_0 = 2;$$

$$f(x) = x^4 - 3ix^3 - 4x^2 + 5ix - 1, x_0 = 1 + 2i.$$

$f(x)$

$x - x_0$:

$$f(x) = x^4 + 2ix^3 - (1+i)x^2 - 3x + 7 + i, x_0 = -i;$$

$$f(x) = x^4 + (3-8i)x^3 - (21+18i)x^2 - (33-20i)x + 7 + 18i, x_0 = -1 + 2i.$$

- 4.

x :

$$f(x) = (x-2)^4 + 4(x-2)^3 + 6(x-2)^2 + 10(x-2) + 20.$$

R.

- 1.
- 2.

C?

R?

$$x^3 - 6x^2 + 11x - 6;$$

$$x^4 + 4;$$

$$x^4 + 4x^3 + 4x^2 + 1.$$

R

$$x^4 + 4;$$

$$x^6 + 27;$$

$$x^4 + 4x^3 + 4x^2 + 1.$$

3, 1+I

m, n, p

$$x^{3m} - x^{3n+1} + x^{3p+2}$$

$$x^2 - x + 1.$$

Q

2.C

Q

$$x^4 - 8x^3 + 12x^2 - 6x + 2;$$

$$x^5 - 12x^3 + 36 - 12.$$

2.

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

Q .

$$x^5 - 1;$$

$$x^6 - 1;$$

$$x^6 + 1;$$

$$x^8 - 1.$$

2

-2.

Mathcad.

-4.

Mathcad.

-7.

Mathcad.

.

Mathcad.

.

.

Mathcad.

Mathcad.

R.

1,2,3

$$x^4 - 2x^3 + 4x^2 - 6x + 8 \quad x - 1;$$

$$4x^3 + x^2 \quad x + 1 + i.$$

$$x^4 + px^2 + q$$

$$x^2 + mx + 1?$$

$$x^5 - 2x^4 + x^3 - 7x^2 - 12x + 10 \quad 3x^4 - 6x^3 + 5x^2 + 2x - 2;$$

$$x^6 + 2x^5 - 4x^3 - 3x^2 + 8x - 5 \quad x^3 + x^2 - x + 1;$$

$$x^5 + 3x^4 - 12x^3 - 52x^2 - 52x - 12 \quad x^4 + 3x^3 - 6x^2 - 22x - 12.$$

$$x^5 - 5x^4 - 2x^3 + 12x^2 - 2x + 12 \quad x^2 + 1;$$

$$2x^4 + 3x^3 - 3x^2 - 5x + 2 \quad x^2 - 5x + 1;$$

$$3x^6 - 3x^4 + 7x^3 - 6x + 2 \quad x^4 - 2x^2 + 4.$$

$f(x_0)$:

$$f(x) = x^5 - 4x^3 + 6x^2 - 8x + 10, x_0 = 2;$$

$$f(x) = x^4 - 3ix^3 - 4x^2 + 5ix - 1, x_0 = 1 + 2i.$$

$f(x)$

$x - x_0$:

$$f(x) = x^4 + 2ix^3 - (1+i)x^2 - 3x + 7 + i, x_0 = -i;$$

$$f(x) = x^4 + (3-8i)x^3 - (21+18i)x^2 - (33-20i)x + 7 + 18i, x_0 = -1 + 2i.$$

x:

$$f(x) = (x-2)^4 + 4(x-2)^3 + 6(x-2)^2 + 10(x-2) + 20.$$

$$2x^3 - 3x^2 + 12x - 5;$$

$$x^4 + 16;$$

$$x^4 + 3x^3 + 3x^2 + 1.$$

R

$$x^4 + 5;$$

$$x^6 + 1;$$

$$x^4 + 3x^3 + 3x^2 + 1.$$

$$x^4 + 1;$$

$$x^4 + x^2 + 1;$$

$$x^4 + 3x^2 + 1.$$

Q

$$x^4 - x^3 + 2x + 1;$$

$$x^3 + 2x^2 - x + 3.$$

$$1) \langle R, * \rangle \quad a * b = \sqrt[3]{a^3 + b^3 + 1};$$

$$2) \left\langle \left\{ \begin{pmatrix} x \\ y \end{pmatrix} \mid x, y \in R \right\}, + \right\rangle;$$

$$3) \left\langle \{(a, b) \mid a, b \in R \& b \neq 0\}, * \right\rangle \quad (a, b) * (c, d) = (ad + bc, bd).$$

$$G = \langle G, * \rangle \quad e$$

a G

$$a * a = e \quad G$$

5.

6 f

$$\begin{pmatrix} a & b \\ 0 & 0 \end{pmatrix} \quad a, b \in Z$$

f

$$1) f\left(\begin{pmatrix} a & b \\ 0 & 0 \end{pmatrix}\right) = 2a + b; 2) f\left(\begin{pmatrix} a & b \\ 0 & 0 \end{pmatrix}\right) = 2a + 1.$$

7

$n;$

$$\begin{pmatrix} a & b \\ 0 & 0 \end{pmatrix} \quad a, b \in \mathbb{Z}$$

$$k + m\sqrt{2} \quad k, m \in \mathbb{Z};$$

8

9 G

$$\varphi(a) = a',$$

$G.$

10

11

$$1) \quad a + b\sqrt{3} \quad a \quad b$$

$$\begin{pmatrix} a & b \\ 0 & c \end{pmatrix} \quad a, b, c \in \mathbb{Q}$$

$$\begin{pmatrix} a & b \\ 3b & a \end{pmatrix} \quad a, b \in \mathbb{R}$$

\mathbb{R}^2

\oplus

\otimes

$$\otimes \quad A \otimes B = A \cdot B + B \cdot A.$$

$$(a, b) \oplus (c, d) = (a + c, b + d);$$

$$(a, b) \otimes (c, d) = (a \cdot c, b \cdot d).$$

12.

4)

1

$\mathbb{Z}[i] \quad \mathbb{R}[x].$

14 $\langle \{0,1\}, \oplus, \otimes \rangle$

$\oplus \quad \otimes$

?

\otimes	0	1
0	0	0
1	0	1

\oplus	0	1
0	0	1
1	1	0

15

$\mathbb{Q} \quad \mathbb{R}$

16 f

$\begin{pmatrix} a & b \\ 0 & c \end{pmatrix} \quad a, b, c \in \mathbb{R}$

$$f\left(\begin{pmatrix} a & b \\ 0 & c \end{pmatrix}\right) = a \cdot$$

f

17 f

$\begin{pmatrix} a & 5b \\ b & a \end{pmatrix} \quad a, b \in \mathbb{Q} \quad \mathbb{Q}$

$[\sqrt{5}] \quad f\left(\begin{pmatrix} a & 5b \\ b & a \end{pmatrix}\right) = a + (a+b)\sqrt{5}?$

18 $\begin{pmatrix} a & b \\ 0 & c \end{pmatrix} \quad a, b, c \in \mathbb{R} \quad -$

19 $\mathbb{Z}[x]$

20.

$$\begin{aligned} x^4 - 2x^3 + 4x^2 - 6x + 8 & \quad x-1; \\ 4x^3 + x^2 & \quad x+1+i. \end{aligned}$$

21. $x^4 + px^2 + q \quad x^2 + mx + 1?$

22.

$$\begin{aligned} x^5 - 2x^4 + x^3 - 7x^2 - 12x + 10 & \quad 3x^4 - 6x^3 + 5x^2 + 2x - 2; \\ x^6 + 2x^5 - 4x^3 - 3x^2 + 8x - 5 & \quad x^3 + x^2 - x + 1; \\ x^5 + 3x^4 - 12x^3 - 52x^2 - 52x - 12 & \quad x^4 + 3x^3 - 6x^2 - 22x - 12. \end{aligned}$$

23.

$$\begin{aligned} x^5 - 5x^4 - 2x^3 + 12x^2 - 2x + 12 & \quad x^2 + 1; \\ 2x^4 + 3x^3 - 3x^2 - 5x + 2 & \quad x^2 - 5x + 1; \\ 3x^6 - 3x^4 + 7x^3 - 6x + 2 & \quad x^4 - 2x^2 + 4. \end{aligned}$$

24. $f(x_0):$

$$\begin{aligned} f(x) = x^5 - 4x^3 + 6x^2 - 8x + 10, x_0 = 2; \\ f(x) = x^4 - 3ix^3 - 4x^2 + 5ix - 1, x_0 = 1 + 2i. \end{aligned}$$

25. $f(x) \quad x - x_0:$

$$\begin{aligned} f(x) = x^4 + 2ix^3 - (1+i)x^2 - 3x + 7 + i, x_0 = -i; \\ f(x) = x^4 + (3-8i)x^3 - (21+18i)x^2 - (33-20i)x + 7 + 18i, x_0 = -1 + 2i. \end{aligned}$$

26. $x:$

$$f(x) = (x-2)^4 + 4(x-2)^3 + 6(x-2)^2 + 10(x-2) + 20.$$

27.

$$\begin{aligned} 2x^3 - 3x^2 + 12x - 5; \\ x^4 + 16; \end{aligned}$$

$$x^4 + 3x^3 + 3x^2 + 1.$$

28.

R

$$x^4 + 5;$$

$$x^6 + 1;$$

$$x^4 + 3x^3 + 3x^2 + 1.$$

29.

i

$$-1-i$$

30.

m, n, p

$$x^{3m} + x^{3n+1} + x^{3p+2}$$

$$x^4 + x^2 + 1.$$

31.

$$x^4 + 1;$$

$$x^4 + x^2 + 1;$$

$$x^4 + 3x^2 + 1.$$

32

Q

$$x^4 - x^3 + 2x + 1;$$

$$x^3 + 2x^2 - x + 3.$$

$f(1) -$

$f(x)$

$f(0)$

U

$\bar{A}, \bar{B}, A \cap B, A \cup B, \setminus, \setminus, \Delta$

$A = \{1, 2, 3, 4, 5\},$

$B = \{2, 4, 6\}.$

2.

A

-1

$A = \{1, 2, 3, 4, 5\}, B = \{a, b, c, d\}, \rho = \{(1, a), (2, b), (3, c), (4, a), (5, b)\}.$

$$\rho = \{(x, y) \mid x, y \in Z \& |x| = |y|\}.$$

$$\begin{cases} 3x_1 - x_2 + 2x_3 = 3, \\ 2x_1 - x_2 + 3x_3 = 3, \\ x_1 + 5x_2 - 4x_3 = 7. \end{cases}$$

3.

$$A_1 = (1; 2; 3), \quad A_2 = (0; 3; -2), \quad A_3 = (1; -1; 1)$$

$$A^{-1} = \begin{pmatrix} 3 & 2 & 1 \\ 3 & 2 & 2 \\ 1 & 3 & 1 \end{pmatrix}.$$

$$\begin{pmatrix} 1 & -2 \\ 3 & -5 \end{pmatrix} \cdot X = \begin{pmatrix} 1 & 0 & -3 \\ -1 & 2 & 1 \end{pmatrix}.$$

1) $\langle N, - \rangle$; 2) $\langle N, + \rangle$; 3) $\langle Z, * \rangle$ $a * b = a + b + 18.$

$$a + b\sqrt{7} \quad a \quad b$$

3.

$n.$

2.

$$f: z \rightarrow \bar{z} \quad a + bi\sqrt{5} \quad a, b \in Q$$

3.

$$8x^4 + 8x^3 - 27x - 27$$

$R.$

$$x^5 + 3x^4 + x^3 - 5x^2 - 6x - 2 \quad x^5 + 2x^4 - 3x^2 - 4x - 2.$$

$i,$

		*)
1		

(*)

1		4,75-5
2		3,75-4,5
3		3-3,5
4		

5.

n -

21.

$U, \bar{A}, \bar{B}, A \cap B, A \cup B, \setminus, \setminus, \Delta$
 $A = (0; 4), B = [0; 2].$

$$\begin{cases} 2x_1 + 7x_2 + 3x_3 + x_4 = 6, \\ 3x_1 + 5x_2 + 2x_3 + 2x_4 = 4, \\ 9x_1 + 4x_2 + x_3 + 7x_4 = 2. \end{cases}$$

5.

$$\begin{vmatrix} 5 & 1 & 2 & 7 \\ 3 & 0 & 0 & 2 \\ 1 & 3 & 4 & 5 \\ 2 & 0 & 0 & 3 \end{vmatrix}.$$

5

10.

14.

26.

30.

R.
32.

Q.

$a, b \in \mathbb{Z}$
 f
 $\begin{pmatrix} a & b \\ 0 & 0 \end{pmatrix}$
 f

$$f\left(\begin{pmatrix} a & b \\ 0 & 0 \end{pmatrix}\right) = 3a.$$

$$f(x) = x^4 + 2x^3 - 3x^2 - 4x + 1$$

1		
2		

(*)

1		4,75-5
2		3,75-4,5
3		3-3,5
4		

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ЭЛЕКТРОННОЙ ПОДПИСЬЮ

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