

Matematika-informatika qánigeligi 2-kurs talabalari ushın Algebra hám sanlar teoriyası páninen Aralıq qadaǵalaw ushın teoriyalıq sawallar toplamı

Bir ózgeriwshili kópáǵzalılar

Kóp ózgeriwshi kópáǵzalılar kalcosı.

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Simmetriyalıq kópáǵzalılar haqqındag'ı tiykarǵı teorema.

Rezultant

Kóp ózgeriwshili kópáǵzalılardan dızilgen teńlemelerdi Rezultant járdeminde sheshiw

Pu'tin koeffitsientli kópáǵzalınıń pu'tin korenleri.

Pu'tin koeffitsientli kópáǵzalınıń ratsional korenleri.

Eyzenshteynniń kópáǵzalılar ushın keltirilmeslik belgisi

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Kóp áǵzalılardıń EUUB hám EKUE

Kardano usılı járdeminde sheshiw

Ferrari usılı menen sheshiw

$$R(x) = \left| \begin{array}{cccc} 1 & -1 & x^2 - 3x & 0 \\ 0 & 1 & -1 & x^2 - 3x \\ 1 & 11 - 6x & x^2 + 7x - 12 & 0 \\ 0 & 1 & 11 - 6x & -x^2 + 7x - 12 \end{array} \right| \stackrel{'''}{=} =$$

$$= 2x(x-2)(20x^2 - 100x + 120) = 40x(x-2)^2(x-3)$$

Bundan $x_1 = 0$, $x_2 = 2$, $x_3 = 0$ yechimlarni topamiz. x o'zgaruvchining qiymatlarini sistemaga qo'yib y ning qiymatlarini topamiz.

- 1) $x = 0$ da $y = 1$ bo'lib, $(0;1)$ yechim.
- 2) $x = 2$ da $y = -1 \wedge y = 2$ bo'lib, $(2;-1) \wedge (2;2)$ yechimlar.
- 3) $x = 3$ da $y = 0$ bo'lib, $(3,0)$ yechim.



Misol va mashqlar

1. Berilgan ko'phadlarni kanonik shaklga keltiring:

1.1. $f(x, y) = (x - y)^2(x^2 + xy + y^2)(x + 2y) + x^2 - 1$

1.2. $f(x, y) = (x - y)(xy - z)(x - z)xyz$.

2. Berilgan ko'phadlarni leksiografik tartibda yozing va uning yuqori hadini toping:

2.1. $f(x, y, z) = (\bar{2}x + \bar{3}y)^2 z - x(y + z - \bar{3}xz)$, $Z_5[x, y, z]$.

2.2. $f(x, y, z, t) = (x + y)(z + y) + \bar{2}x(y + t + \bar{1}) + (y + z)^3$, $Z_3[x, y, z, t]$.

3. Quyidagi ko'phadlarni simmetrik ko'phadga to'ldiring:

3.1. $f(x, y) = x^2 + 2y$.

3.2. $f(x, y) = x^3 + x^2y + xy$.

3.3. $f(x, y, z) = x^3 + 2xy + 2yz + 5$.

3.4. $f(x, y, z) = (x + y)^2 + 2xz + xyz$.

4. Quyidagi ko'phadlarning yuqori hadini toping:

4.1. $f(x_1, y_2) = 5\zeta_1^2 \zeta_2 \zeta_3$.

4.2. $f(x_1, y_2) = 5\zeta_1^2 + 2\zeta_2 \zeta_3 - 3\zeta_3^2$.

5. Quyidagi ko'phadlarni elementar ko'phadlar yordamida ifodalang:

5.1. $f(x, y) = x^3y + y^3x + 2x^2 + 2y^2$.

5.2. $f(x, y) = 2x^4y - 5x^2y + 2xy^4 - 5xy^2$.

5.3. $f(x, y, z) = x^2y + xy^2 + x^2z + xz + y^2z + yz^2$.

5.4. $f(x, y, z) = x^4 + y^4 + z^4 - 2x^2y^2 - 2x^2z^2 - 2y^2z^2$.

5.5. $f(x, y, z, t) = (xy + zt)(xz + yt)(xt + yz)$.

5.6. $f(x, y, z) = (xy + z)(xz + y)(yz + x)$.

6. Agar $n \in \mathbb{N}$ uchun $S_n(x, y) = x^n + y^n$ bo'lsa, barcha $k > 2$ uchun

$S_k = \zeta_1 S_{k-1} - \zeta_2 S_{k-2}$ ekanligini isbotlang.

7. 6-misoldagi formula yordamida quyidagilarni o'rinli ekanligini tekshiring:

7.1. $S_2 = \zeta_1^2 - 2\zeta_2$.

7.2. $S_3 = \zeta_1^3 - 3\zeta_1\zeta_2$.

7.3. $S_4 = \zeta_1^4 - 4\zeta_1^2\zeta_2 + 2\zeta_2^2$.

7.4. $S_7 = \zeta_1^7 - 7\zeta_1^5\zeta_2 + 14\zeta_1^3\zeta_2^2 - 7\zeta_1\zeta_2^3$.

8. Agar $n \in \mathbb{N}$ uchun $S_n(x, y, z) = x^n + y^n + z^n$ bo'lsa, barcha $k > 3$ uchun

$S_k = \sigma_1 S_{k-1} - \sigma_2 S_{k-2} + \sigma_3 S_{k-3}$ ekanligini isbotlang.

9. 8-misoldan foydalanib quyidagilar o'rinli ekanligini tekshiring:

9.1. $S_3 = \sigma_1^3 - 3\sigma_1\sigma_2 + 3\sigma_3$.

9.2. $S_4 = \sigma_1^4 - 4\sigma_1^2\sigma_2 + 2\sigma_2^2 + 4\sigma_1\sigma_3$.

9.3. $S_5 = \sigma_1^5 - 5\sigma_1^3\sigma_2 + 5\sigma_1\sigma_2^2 + 5\sigma_1^2\sigma_3 - 5\sigma_2\sigma_3$.

9.4. $S_6 = \sigma_1^6 - 6\sigma_1^4\sigma_2 + 9\sigma_1^2\sigma_2^2 - 2\sigma_2^3 + 6\sigma_1^3\sigma_3 - 12\sigma_1\sigma_2\sigma_3 + 3\sigma_3^2$.

10. Berilgan ratsional kasrlar surat va mahrajini elementar simmetrik

ko'phadlar orqali ifodalab qiymatini toping:

10.1. $\frac{f(x, y)}{g(x, y)} = \frac{(x-y)^4}{x+y}$ va $\zeta_1 = 2$, $\zeta_2 = 1$.

$$10.2. \frac{f(x, y, z)}{g(x, y, z)} = \frac{1}{y} + \frac{1}{z} + \frac{1}{x} + \frac{2}{xy} + \frac{2}{xz} + \frac{2}{yz} \text{ va } \zeta_1 = 0, \zeta_2 = 1, \zeta_3 = 2.$$

11. Quyidagi hadlar orbitasini elementar simmetrik ko'phadlar yordamida ifodalang:

$$1.1. x_1^3 x_3, P[x_1, x_2, x_3].$$

$$1.2. x_1 x_2 x_3, P[x_1, x_2, x_3, x_4].$$

$$1.3. x_1^3, P[x_1, x_2, \dots, x_n]$$

12. Isbotlang:

$$12.1. x^4 + y^4 + (x - y^4) = 2(x^2 + xy + y^2)^2.$$

$$12.2. (x + y)^3 + 3xy(1 - x - y) - 1 = (x + y - 1)(x^2 + y^2 - xy + x + y + 1).$$

$$12.3. x(y + z)^2 + y(x + z)^2 + z(x + y)^2 = (y + z)(x + z)(x + y) + 4xyz.$$

$$12.4. (xy + xz + yz)^3 + (x^2 - yz)^2 + (y^2 - zx)^2 + (z^2 - xy)^2 = (x^2 + y^2 + z^2)^2.$$

13. Agar $x + y + z = 0$ bo'lsa, quyidagi tengliklarni isbotlang:

$$13.1. x^4 + y^4 + z^4 = 2(xy + xz + yz)^2.$$

$$13.2. 2(x^4 + y^4 + z^4) = (x^2 + y^2 + z^2)^2.$$

$$13.3. 2(x^5 + y^5 + z^5) = 5xyz(x^2 + y^2 + z^2).$$

14. Berilgan ko'phadlar rezultantini hisoblang:

$$1.1. f(x) = 6x^2 + x - 2, g(x) = 3x^2 - 4x + 2.$$

$$1.2. f(x) = x^4 - 2x^2 + 3, g(x) = x^2 - x + 1.$$

$$1.3. f(x) = x^2 - 2x + 2, g(x) = 2x^2 + x - 5.$$

$$1.4. f(x) = x^3 + 2x^2 + 4x + 1, g(x) = 3x^2 + 4x + 4.$$

15. a ning qanday qiymatlarida berilgan ko'phadlar umumiy ildizga ega:

$$15.1. f(x) = 2x^2 + ax - 3, g(x) = ax^2 + x - 2.$$

$$15.2. f(x) = x^3 - 5x^2 + 4ax - 4, g(x) = 3x^2 - 5ax + 8.$$

$$15.3. f(x) = x^3 - ax + 2, g(x) = x^2 + ax + 2.$$

$$15.4. f(x) = x^3 + ax^2 - 9, g(x) = x^3 + ax - 3.$$

16. Berilgan ko'phadlar diskriminantini hisoblang:

16.1. $f(x) = x^3 + 6x + 2$.

16.2. $f(x) = x^3 - 9x^2 + 21x - 5$.

16.3. $f(x) = x^5 + 2$.

16.4. $f(x) = ax^2 + bx + c$.

16.5. $f(x) = x^3 + px + q$.

16.6. $f(x) = x^3 + ax^2 + bx + c$.

17. Isbotlang:

17.1. $R(f, g_1 \pm g_2) = R(f_1g_1) \pm R(f_1g_2)$, $\deg f = 1$.

17.2. $R(f, g_1 \cdot g_2) = R(f_1g_1) \cdot R(f_1g_2)$.

17.3. $R(f_1 \cdot f_2, g_1 \cdot g_2) = R(f_1g_1) \cdot R(f_1g_2) \cdot R(f_2, g_1) \cdot R(f_2g_2)$.

17.4. $D((x-a) \cdot f(x)) = D(f(x)) \cdot (f(a))^2$.

17.5. $D(f \cdot g) = D(f) \cdot D(g) \cdot (R(f, g))^2$.

18. a ning qanday qiymatlarida ko'phad karrali ildizga ega?

18.1. $f(x) = x^3 - 3x + a$.

18.2. $f(x) = x^4 - 4x + a$.

18.3. $f(x) = 4x^3 - ax + 1$.

18.4. $f(x) = x^3 + (2-3i)x^2 - ax - 2$.

19. Tenglamalar sistemasini yeching:

19.1.
$$\begin{cases} x^2 + 2y^2 = 17 \\ 6x^2 - xy - 12y^2 = 0 \end{cases}$$

19.2.
$$\begin{cases} y^2 - 5y + 4x - 4 = 0 \\ 2y^2 + y - x^2 + 1 = 0 \end{cases}$$

19.3.
$$\begin{cases} 5x^2 - 5y^2 - 3x + 9y = 0 \\ 5x^3 + 5y^3 - 15x^2 - 13xy - y^2 = 0 \end{cases}$$

$$19.4. \begin{cases} (y-1)x^2 + xy - 3 = 0 \\ (y-1)x^2 - 2x + y - 1 = 0 \end{cases}$$

20. R maydonida quyidagi sistemalarni yeching:

$$20.1. \begin{cases} x^3 + y^3 = 35 \\ x + y + 5 \end{cases}$$

$$20.2. \begin{cases} x^2 + xy + y^2 = 49 \\ x^4 + x^{2y} + y = 931 \end{cases}$$

$$20.3. \begin{cases} x + y + z = 1 \\ x^2 + y^2 + z^2 = 9 \\ x^3 + y^3 + z^3 = 1 \end{cases}$$

$$20.4. \begin{cases} x - y + z = 6 \\ x^2 + y^2 + z^2 = 14 \\ x^3 - y^3 + z^3 = 36 \end{cases}$$

$$20.5. \begin{cases} \sqrt{x} + \sqrt{y} = 9 \\ \sqrt[3]{x} + \sqrt[3]{y} = 5 \end{cases}$$

$$20.6. \begin{cases} \sqrt{\frac{x}{y}} + \sqrt{\frac{y}{x}} = \frac{61}{\sqrt{xy}} + 1 \\ \sqrt[4]{x^3y} + \sqrt[4]{xy^3} = 78 \end{cases}$$

21. Quyidagi tenglamalarni yeching.

$$21.1. x + \sqrt{17-x^2} + x\sqrt{17-x^2} = 9.$$

$$21.2. \sqrt[3]{10-x} - \sqrt[3]{3-x} = 1.$$

$$21.3. \sqrt[4]{8-x} + \sqrt[4]{89+x} = 5.$$

$$21.4. \sqrt[4]{78 + \sqrt[3]{24 + \sqrt{x}}} - \sqrt[4]{84 - \sqrt[3]{30 - \sqrt{x}}} = 0.$$



Takrorlash uchun savollar

1. Ko'p o'zgaruvchili ko'phadlar halqasi.

1.2. $f(x) = x^2 + x + 1, Q$.

1.3. $f(x) = x^2 + x + 1, Z_5$.

1.4. $f(x) = x^6 + x^3 + 1, Q$.

2. Q maydonda berilgan quyidagi ko'phadlarni keltirilmaydigan ko'phadlar ko'paytmasiga yoying.

2.1. $f(x) = 2x^5 - x^4 - 6x^3 + 3x^2 + 4x - 2$

2.2. $f(x) = 3x^5 + x^4 - 15x^3 - 5x^2 + 12x + 4$

3. $f(x) = 2x^5 - x^4 - 2x^3 + x^2 - 4x + 2$ ko'phadning 2 juft bir-biriga qarama-qarshi ildizlari mavjudligi ma'lum bo'lsa, uni Q, R, C maydonlardagi keltirilmaydigan ko'phadlarga yoyilmasini toping.

4. Q maydonda berilgan 3-darajali ko'phad keltiriluvchi bo'lishi uchun uning bitta ildizi ratsional son bo'lishi zarur va etarli ekanligini isbotlang.

5. $Z[x]$ halqada quyidagi ko'phadlar keltirilmasligini isbotlang.

5.1. $f(x) = x^5 - x^2 + 1$.

5.2. $f(x) = x^5 + x^4 + x^3 + x^2 + 1$.

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

6. $f(x) = x^4 + 4$ ko'phad Z_5, Q, R, C maydonlarning qaysi birida keltiriluvchi?

7. Quyidagi ko'phadlarni keltirilmaydigan ko'phadlarga yoying.

7.1. $f(x) = x^4 - 6x^3 + 11x^2 - 6x + 1, R[x]$.

7.2. $f(x) = x^4 + 4, C[x]$.

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

7.4. $f(x) = x^4 + 4; C[x]$.

7.5. $f(x) = x^2(x-3)^2 + 4x^2 - 12x + 4$.

7.6. $f(x) = x^6 + 27; C[x]$.

7.7. $f(x) = (x+2)(x+3)(x+4)(x+5) + 1$.

7.8. $f(x) = x^{2n} + x^4 + 1; C[x]$.

8. Quyidagi ko'phadlarning EKUB va EKUK larini toping:

8.1. $f(x)(x-1)^2(x^2-5x+6), g(x) = x^2 - x - 2, z[x]$

8.2. $f(x) = (x^2 - 2x + 3)^2(x^2 + 5x - 6)^2, g(x) = (x^2 - 8x + 12)^2(x^3 - 1), Q[x]$

8.3. $f(x) = x^4 + 2x^3 - 2x - 1, g(x) = (x+1)(x^2 - x - 2), Q[x]$

8.4. $f(x) = x^5 - x, g(x) = (x^2 + x + 1)^2(\bar{2}x + \bar{4}), z_5[x]$

8.5. $f(x) = x^m - 1, g(x) = x^n - 1$

8.6. $f(x) = x^m + 1, g(x) = x^n + 1$

9. Quyidagi ko'phadlarning hosilasini toping:

9.1. $f(x) = (x^2 + x - 1)^3(x^3 - 2), Q[x];$

9.2. $f(x) = \bar{4}x^{10} + \bar{3}x^2(x + 3), Z_5[x].$

10. Agar $Z_3[x]$ halqada $f'(x) = \bar{2}x + \bar{1}$ va $f(\bar{1}) = 1$ bo'lsa, 6 darajali $f(x)$ ko'phadni toping.

11. Agar $Q[x]$ halqada $f''(x) = 24x + 2, f(0) = 1$ va $f(1) = 5$ bo'lsa, $f(x)$ ko'phadni toping.

12. $Z_2[x]$ halqada darajasi 3 dan katta bo'lmagan va o'z hosilasiga bo'linuvchi barcha $f(x)$ ko'phadlarni toping.

13. $f(x)$ ko'phadni $x - a$ darajalariga yoying va hosilalarining a nuqtadagi qiymatini toping.

13.1. $f(x) = ix^4 + (1-i)x^3 - (2+i)x^2 + 3x - 3 - 4i, a = 2i, C[x].$

13.2. $f(x) = x^5 - 3ix^3 - 4x^2 + 5ix - 1, a = -i, G[x].$

13.3. $f(x) = (x-3)(x-2)(x+1)(x+4) + 1, a = -1, Q[x].$

13.4. $f(x) = \bar{2}x^4 + x^3 + x\bar{2}, a = \bar{1}, z_3[x].$

13.5. $f(x) = x^4 - 8x^3 + 24x^2 - 50x + 90, a = 2, R[x].$

13.6. $f(x) = x^5 - 4x^3 + 6x^2 - 8x + 10, a = 2, R[x].$

14. Berilgan ildizlar necha karrali ekanligini aniqlang.

14.1. $\alpha = 3$; $f(x) = x^4 - 6x^3 + 10x^2 - 6x + 9$, $Q[x]$.

14.2. $\alpha = 2$; $f(x) = x^5 - 4x^4 + 7x^3 - 11x^2 + 4$, $Q[x]$.

14.3. $\alpha = 1 + i$; $f(x) = x^4 - (3 + 4i)x^3 + (3 + 3i)x^2 + (8 - 2i)x - 2 - 2i$, $C[x]$.

14.4. $\alpha = 2$; $f(x) = x^5 - 5x^4 + 7x^3 - 2x^2 + 4x - 8$.

14.5. $\alpha = 3$; $f(x) = x^5 - 6x^4 + 2x^3 + 36x^2 - 27x - 54$.

15. $R[x]$ da b ning qanday qiymatlarida berilgan ko'phad karrali ildizga ega:

15.1. $f(x) = x^5 - 5x^3 + b$,

15.2. $f(x) = x^3 - 4x^2 - 3x + b$,

15.3. $f(x) = x^3 + 3x^2 + 3bx - 4$,

15.4. $f(x) = x^3 + 5x^2 + 8x + b$.

16. Berilgan ko'phadlarning karrali ildizga ega bo'lishining zarur va etarli shartlarini aniqlang:

16.1. $f(x) = x^4 + ax + b$.

16.2. $f(x) = x^5 + ax^3 + b$.

17. Berilgan ko'phadlarni keltirilmaydigan ko'phadlar kanonik yoyilmasini toping:

17.1. $f(x) = x^5 + 4x^4 + 7x^3 + 8x^2 + 5x + 2$.

17.2. $f(x) = x^5 - ix^4 + 5x^3 - ix^2 + 8x + 4i$.

17.3. $f(x) = x^5 + 5x^4 + (6 - i)x^3 - (4 + 6i)x^2 - (8 + 12i)x - 8i$.

17.4. $f(x) = x^6 - 6x^4 - 4x^3 + 9x^2 + 12x + 4$.

18. Quyidagi shartlar asosida kompleks koeffitsientli eng kichik darajali ko'phadni aniqlang:

18.1. 1–ikki karrali, 2,3, $1 + i$ – bir karrali ildizlar.

18.2. i –ikki karrali, $-1 - i$ – bir karrali ildizlar.

19. $R[x]$ halqada berilgan kasrlarni qisqarmas kasrga keltiring:

$$19.1. \frac{x^2 - 4x + 3}{x^2 - 5x + 6}.$$

$$19.2. \frac{x^8 + x^4 + 1}{x^2 + x + 1}.$$

20. Q maydonda berilgan kasrni elementar kasrlarga yoying.

$$20.1. \frac{f(x)}{g(x)} = \frac{x + 3}{(x^3 - 2)(x + 1)};$$

$$20.2. \frac{f(x)}{g(x)} = \frac{1}{x^4 - 2x};$$

$$20.3. \frac{f(x)}{g(x)} = \frac{x^2}{x^4 - 4};$$

$$20.4. \frac{f(x)}{g(x)} = \frac{1}{x^3 + x}.$$

21. R maydonda berilgan kasrni elementar kasrlarga yoying:

$$21.1. \frac{f(x)}{g(x)} = \frac{x^3 - 1}{(x^2 + x + 1)^2(x^2 + 1)};$$

$$21.2. \frac{f(x)}{g(x)} = \frac{x^4 + 2x^3 - 18x^2 + 54}{x^5 + 6x^4 + 9x^3};$$

$$21.3. \frac{f(x)}{g(x)} = \frac{x^2 + 3x + 2}{(x^4 + 4)(x + 2)};$$

$$21.4. \frac{f(x)}{g(x)} = \frac{x^2}{x^4 - 4};$$

$$21.5. \frac{f(x)}{g(x)} = \frac{x + 3}{(x^3 - 2)(x + 1)};$$

$$21.6. \frac{f(x)}{g(x)} = \frac{x^2}{(x^2 + x + 2)^2};$$

$$21.7. \frac{f(x)}{g(x)} = \frac{x^2}{x^4 - 16};$$

$$21.8. \frac{f(x)}{g(x)} = \frac{1}{x^4 + 4};$$

22. C maydonda berilgan kasrni elementar kasrlarga yoying:

$$22.1. \frac{f(x)}{g(x)} = \frac{x^2}{(x-1)(x+2)(x+3)};$$

$$22.2. \frac{f(x)}{g(x)} = \frac{1}{x^4 + 4};$$

$$22.3. \frac{f(x)}{g(x)} = \frac{5x^2 + 6x - 23}{(x-1)^3(x+1)^2(x-2)};$$

$$22.4. \frac{f(x)}{g(x)} = \frac{i}{(x-i)(x+2i)};$$

$$22.5. \frac{f(x)}{g(x)} = \frac{2x}{(x-1)(x^2+1)};$$

$$22.6. \frac{f(x)}{g(x)} = \frac{x^2}{x^4 - 4}.$$

23. Z_5 maydonda (r – tub son) $\frac{f(x)}{g(x)} = \frac{\bar{1}}{x^p - x}$ kasrni elementar kasrlarga

yoying.

24. Maydon ustida keltirilmaydigan ko'phadlarning quyidagi xossalarini isbotlang:

1⁰. Agar $p(x)$ va $g(x)$ keltirilmaydigan ko'phadlar bo'lib $r(x):g(x)$ bo'lsa, u holda $r(x)=ag(x)$ ($a \neq 0$) bo'ladi.

2⁰. Ixtiyoriy $f(x)$ ko'phad keltirilmaydigan ixtiyoriy $r(x)$ ko'phadga bo'linadi yoki $(f(x);r(x))=1$ bo'ladi.

3⁰. Agar $f_i(x)$ ($i=1,m$) ko'phadlarning hech biri keltirilmaydigan $r(x)$ ko'phadga bo'linmasa, u holda $f_1(x) \cdot f_2(x) \dots f_m(x) \not\equiv r(x)$ bo'ladi.

4⁰. Agar $f_1(x) f_2(x) \dots f_m(x):r(x)$ ($p(x)$ – keltirilmaydigan ko'phad), u holda $f_i(x)$ ($i=1,m$) ko'phadlarning aqalli bittasi $r(x)$ ga bo'linadi.

5⁰. $p(x)$ keltirilmaydigan ko'phad bo'lsa, u holda $ap(x)$ ($0 \neq a \in F$) ham keltirilmaydigan ko'phad bo'ladi.

25. Agar $x_1 = a + bi$ berilgan $f(x)$ ko'phadning ildizi bo'lsa, uning qolgan yechimlarini toping:

- 25.1. $f(x) = x^3 - 4x^2 + 3x + 30$; $x_1 = 3 + i\sqrt{6}$.
 25.2. $f(x) = x^3 - 4x^2 + 3x + 30$; $x_1 = 3 - i\sqrt{6}$.
 25.3. $f(x) = 4x^4 - 24x^3 + 53x^2 + 18x - 42$; $x_1 = 3 - i\sqrt{5}$.
 25.4. $f(x) = x^4 + 2x^3 + 2x^2 + 6x - 3$; $x_1 = -1 - i\sqrt{2}$.

26. Kardano formulari yordamida quyidagi tenglamalarni yeching:

- 26.1. $-2x^3 - 2x^2 + 12x - 24$; 26.6. $-5x^3 + 8x^2 - 3x - 24$;
 26.2. $2x^3 + 4x^2 + 4x + 4$; 26.7. $2x^3 + 8x^2 - 12x + 12$;
 26.3. $2x^3 + 8x^2 - 2x + 5$; 26.8. $2x^3 + 4x^2 + 4x + 4$;
 26.4. $-5x^3 + 8x^2 - 3x - 3$; 26.9. $5x^3 + x^2 - 3x - 2$;
 26.5. $6x^3 - 8x^2 + 5x - 3$;

27. Ferrari usuli bilan quyidagi tenglamalarni yeching:

- 27.1. $x^4 - 2x^3 - 2x^2 + 12x - 24$; 27.4. $x^4 - 5x^3 + 8x^2 - 3x - 24$;
 27.2. $x^4 + 2x^3 + 4x^2 + 4x + 4$; 27.5. $x^4 - 2x^3 + 8x^2 - 12x + 12$;
 27.3. $x^4 - 2x^3 + 8x^2 - 12x + 12$; 27.6. $x^4 - 5x^3 + x^2 - 3x - 2$.

28. Ko'phadning butun ildizlarini toping:

- 28.1. $f(x) = x^4 - 3x^2 - 14$; 28.5. $f(x) = x^5 + 3x - 9$;
 28.2. $f(x) = 4x^4 + 3x^2 - 4$; 28.6. $f(x) = x^5 + 3x - 8$;
 28.3. $f(x) = x^4 + 4x^3 + 27$; 28.7. $f(x) = x^5 + 3x - 12$;
 28.4. $f(x) = x^4 - 3x^2 - 24$; 28.8. $f(x) = x^3 + 2x^2 - 3x + 2$;

29. Ko'phadning ratsional ildizlarini toping:

- 29.1. $f(x) = 4x^5 + 4x^4 + 7x^3 + 8x^2 + 5x + 2$.
 29.2. $f(x) = 5x^5 - x^4 - 2x^3 - 27x^2 - 44x + 7$;
 29.3. $f(x) = -4x^5 - x^4 - 6x^3 + 11x^2 - 6x + 1$;
 29.4. $f(x) = 5x^5 + 4x^4 + 4x^3 + 13x^2 + 6x + 9$;
 29.5. $f(x) = -7x^5 + x^4 - 5x^3 - 8x^2 + 19x - 3$.

30. Kasr mahrajini irratsionallikdan qutqaring:

- 30.1. $\frac{7}{1 - \sqrt[4]{2} + \sqrt{2}}$; 30.4. $\frac{2}{\sqrt[3]{49} - \sqrt[3]{7} + 3}$; 30.7. $\frac{\sqrt[3]{2}}{\sqrt[3]{4} + 2\sqrt[3]{2}}$;

$$30.2. \frac{2}{\sqrt[4]{27} - 2\sqrt[4]{9} + \sqrt[4]{3} - 1}; \quad 30.5. \frac{2\sqrt{3}}{\sqrt[3]{25} - \sqrt[3]{5} + 6}; \quad 30.8. \frac{9}{\sqrt[3]{4} + \sqrt[3]{2} + 3};$$

$$30.3. \frac{2\sqrt[3]{5}}{\sqrt[3]{9} - \sqrt[3]{3} + 7}; \quad 30.6. \frac{9\sqrt[3]{2}}{\sqrt[4]{49} - \sqrt[4]{7} + 3}; \quad 30.9. \frac{5}{\sqrt[3]{9} - \sqrt[3]{7}};$$



Takrorlash uchun savollar

1. Ko'phadning butun va ratsional ildizlari.
2. Eyzenshteynning keltirilmaslik alomati.
3. Algebraik elementning minimal ko'phadi.
4. Maydonning oddiy kengaytmasi va uni qurish.
5. Kasr mahrajini algebraik irratsionallikdan qutqarish.
6. Maydonning chekli kengaytmasi. Maydonning murakkab kengaytmasi.
7. Algebraik sonlar maydoni.
8. Tenglamalarni radikallarda echilishi.
9. Uchinchi darajali tenglamalarning kvadrat radikallarda echilish sharti.
10. Kvadrat radikallarda echilmaydigan masalalar.