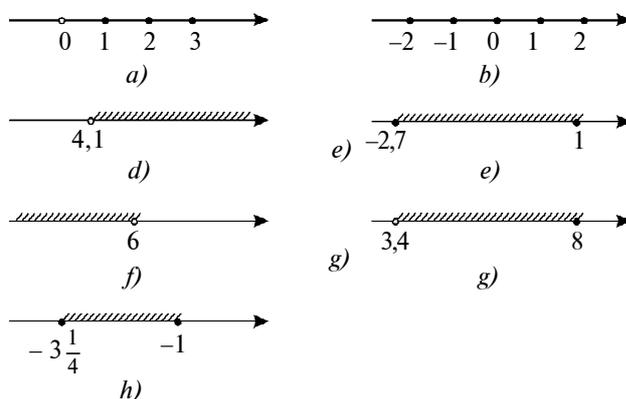


JAVOBLAR

I bob

1.1. $\{1, 9, 2\}$. **1.2.** $10 \in B, 136 \in B$. **1.3.** $S = \{-3; -2; -1; 4\}, S_1 = \{3; 2; 1; -4\}$. **1.4.** $\{B, O', Sh, V, A, Q, T, D, N, U, M, I, L, F, O, Y\}$. **1.5.** a) $\{1; 2; 3; 4\}$; b) $\left(-\frac{7}{4}\right)$; d) $\{0; 12\}$; e) $(-\sqrt{2}; \sqrt{2})$; f) $\{1; 2\}$; g) $\{1; 2; 3\}$. **1.6.** (77- rasm). **1.7.** a) $\{111, 113, 131, 133, 311, 313, 331, 333\}$; b) $\{135, 153, 315, 351, 513, 531\}$; d) $\{104, 140, 203, 302, 320, 401, 410, 500\}$; e) $\{1, 11, 21, 31, 41, 51, 61, 71, 81, 91\}$. **1.8.** a), b). **1.10.** f). **1.14.** a) $E \subset A$; b) $D \subset C$. **1.15.** $\{3\}; \{6\}; \{9\}; \{12\}; \{3; 6\}; \{3; 9\}; \{3; 12\}; \{6; 9\}; \{6; 12\}; \{9; 12\}; \{3; 6; 9\}; \{3; 6; 12\}; \{3; 9; 12\}; \{6; 9; 12\}; \emptyset; A$. **1.16.** a) $A \subset B$; b) $C \subset D$; d) $E \subset F$; e) $K \not\subset M; M \not\subset K$.



77- rasm.

1.17. a) $B \subset A$; b) $A \subset B$; d) $A \subset B; B \subset A$; e) $A \subset B$; f) $A \subset B$; g) $B \subset A$; h) $B \subset A$. **1.18.** a) to'g'ri; b) noto'g'ri; d) to'g'ri; e) noto'g'ri. **1.19.** a) $A = B$; b) $A \neq B$; d) $A \neq B$; e) $A = B$. **1.25.** $\{3; 5\}$. **1.26.** $P \cup E = \{a, b, c, d, e, f, g, z, k\}$. **1.28.** a) $A \cup B = \{x | x = 4k, k \in \mathbb{Z}\}$. **1.31.** $A \setminus B = \{x | x \in \{-5; 3\}\}$. **1.35.** $A = \{x | x = 2k, k \in \mathbb{Z}\}$. **1.44.** 20 kishi. **1.45.** 13 kishi. **1.47.** 68 kishi. **1.48.** 4 ta.

II bob

2.2. Hammasiga. **2.3.** $k = 2431$ bo'lishi mumkin, $k \notin \{15; 18\}$. **2.4.** $k = 1, 3, 5, 7, 15, 21, 35, 105$. **2.23.** a) 2; b) 5555; d) 20; e) 1; f) 1; g) 800. **2.27.** 8. **2.29.** $\{7; 14; 21\}$. **2.30.** $\{117342; 1897524\}$. **2.49.** a) $\frac{5}{6}$; b) 1; d) 9. **2.50.** a) Faraz: $\sqrt{3}$ — ratsional son, $\sqrt{3} = \frac{m}{n} > 0$, bunda $m, n \in \mathbb{N}$ va $B(m; n) = 1$. U holda $3n^2 = m^2$, bundan m^2 ning, demak, m ning ham 3 ga bo'linishi ma'lum bo'ladi; $m = 3k$; $3n^2 = 9k^2$; n^2 ham, demak, n ham 3 ga bo'linadi. $\frac{m}{n}$ kasr 3 ga qisqarmoqda. Bu esa shartga zid, demak, $\sqrt{3}$ soni ratsional son emas. **2.51.** Ratsional son mav-

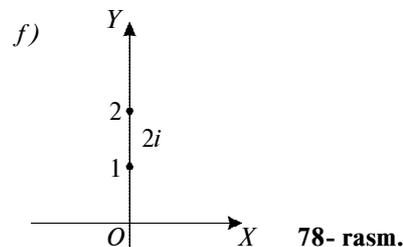
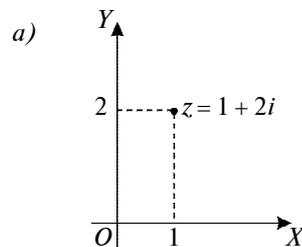
jud va u $r = \frac{m}{n}$, $B(m; n) = 1$ deb faraz qilinsa, $5^{\frac{m}{n}}$ bo'ladi. U holda $5^m = 2^n$ va hokazo. **2.55.** a); e); f); h). **2.57.** Ajratuvchi sonlar: a) $2\pi R$; d) 3. **2.68.** a) $a = b$ yoki $a = -b$; d) $b \in (-\infty; 0]$. **2.74.** $|a| + |b| + |c| + |d| \neq 0$. **2.75.** $|a - b| + |b - c| + |a - c| \neq 0$. **2.76.** $|a - b| + |b - c| + |a - c| \leq 0$. **2.77.** h) 3; i) -4; j) 3; k) 14. **2.79.** a) $x \in \left[7; 8\frac{1}{3}\right]$; d) $x \in [-4, 5; -4)$. **2.80.** $\{-2; -1\}$. a) Ko'rsatma: $0 \leq \frac{x-1}{2} - x < 1$ ning butun yechimlarini toping; e) \emptyset . **2.81.** Agar $p = n$ bo'lsa, $\left[\frac{n}{p}\right] = 1$. Agar $p < n$ bo'lsa, $1 \cdot p, 2 \cdot p, \dots, \left[\frac{n}{p}\right] \cdot p$ sonlarigina p ga bo'linadi. $\left(\left[\frac{n}{p}\right] + 1\right) \cdot p$ soni esa n dan katta. Demak, $\left[\frac{n}{p}\right]$ ta had p ga bo'linadi. Agar $p > n$ bo'lsa, $\left[\frac{n}{p}\right] = 0$. **2.82.** Nollar soni 2 va 5 tub sonlardan tuzilgan juftlar soniga teng. **2.83.** $600! = 1 \cdot 2 \cdot 3 \cdot \dots \cdot 600$ yoyilmada 2 tub sonining $600!$ soni bo'linadigan eng katta darajasi $\left[\frac{600}{2}\right] + \left[\frac{600}{2^2}\right] + \left[\frac{600}{2^3}\right] + \left[\frac{600}{2^4}\right] + \left[\frac{600}{2^5}\right] + \left[\frac{600}{2^6}\right] + \left[\frac{600}{2^7}\right] + \left[\frac{600}{2^8}\right] + \left[\frac{600}{2^9}\right] = 300 + 150 + 75 + 37 + 18 + 9 + 4 + 2 + 1 + 0 = 594$. Javob: 594. Shu kabi 7 tub sonining eng katta darajasi $\left[\frac{600}{7}\right] + \left[\frac{600}{7^2}\right] + \left[\frac{600}{7^3}\right] + \left[\frac{600}{7^4}\right] = 85 + 12 + 1 + 0 = 98$. Javob: 98. 5 soni uchun $\left[\frac{600}{5}\right] + \left[\frac{600}{5^2}\right] + \left[\frac{600}{5^3}\right] = 120 + 24 + 4 = 148$. Javob: 148. **2.84.** $n! = 1 \cdot 2 \cdot \dots \cdot n$ natural sonlar yoyilmasida p tub songa bo'linuvchilar soni $\left[\frac{n}{p}\right]$ ta, p^2 ga bo'linuvchilar soni $\left[\frac{n}{p^2}\right]$ ta, p^3 ga bo'linuvchilar soni $\left[\frac{n}{p^3}\right]$ ta va hokazo. $n!$ yoyilmada p tub son va uning darajalariga bo'linuvchilarning umumiy soni $\left[\frac{n}{p}\right] + \left[\frac{n}{p^2}\right] + \dots + \left[\frac{n}{p^m}\right]$, bunda $p^m < n < p^{m+1}$. **2.89.** a) 1; b) $\frac{1}{3}$; d) 5. **2.92.** a) 25%; b) 60%; d) 250%. **2.95.** 1,75 kg. **2.97.** 240 ta. **2.102.** 9 m va 10,8 m. **2.103.** 8,8 m va 11 m. **2.105.** 2 yildan keyin. **2.106.** a) $70 = 23 \cdot 3 + 1$; b) $180 = 20 \cdot 9$; d) $200 = 11 \cdot 17 + 13$; e) $76 = 8 \cdot 9 + 4$. **2.107.** a) $5 = 0 \cdot 9 + 5$; d) $9 = 0 \cdot 18 + 9$. **2.109.** $q_1 = -q - 1$; $r_1 = b - r$. **2.113.** a) $n = 3, n = 5$; b) $n = 3$; d) hech bir qiymatida; e) $n = 3, n = 9$; f) $n = 3, n = 5, n = 9$; g) hech bir qiymatida; h) $n = 3, n = 9$; i) $n = 4$.

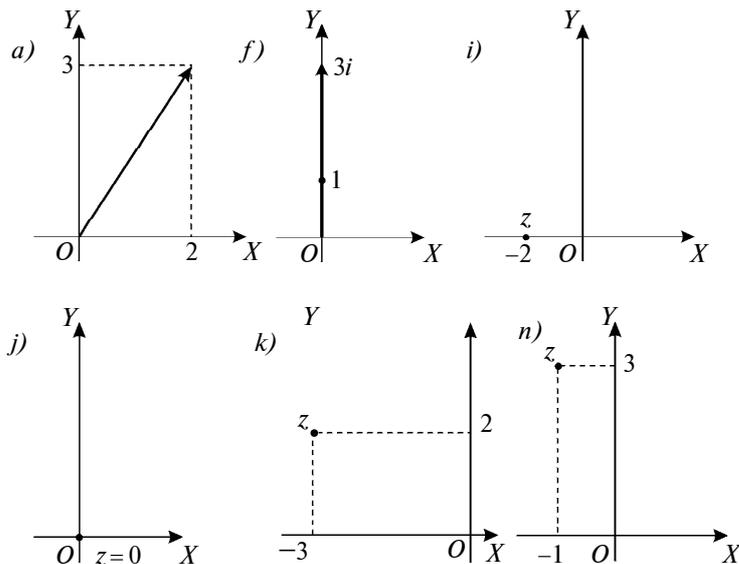
III bob

3.1. a) $\operatorname{Re}(z) = -5, \operatorname{Im}(z) = 8$; j) $\operatorname{Re}(z) = 0, \operatorname{Im}(z) = 8$; l) $\operatorname{Re}(z) = 4, \operatorname{Im}(z) = 0$.
3.2. a) $-4 + 8i$; d) 1,2. **3.5.** a) $\bar{z} = -3 - 5i$; d) $\bar{z} = -3 + 5i$; e) $\bar{z} = 3 - 5i$;

f) $\bar{z} = 3i$; g) $\bar{z} = 4,2$. **3.6.** a) $1+i$; b) 8; d) 0; i) $6-9i$; j) $4+2i$. **3.7.** a) $1+\frac{2}{3}i$;
 b) $1+i$; d) $1+3\frac{1}{9}i$; e) $4+13i$. **3.8.** a) $-13+11i$; f) $3\frac{5}{9}i$; g) $\frac{-1-\sqrt{2}}{2} + \frac{-1-\sqrt{2}}{2}i$;
 h) $\frac{67+5\sqrt{2}}{15} + i$. **3.9.** a) $-9+19i$; h) 13. **3.10.** b) $2-0,6i$; j) $12+3i$;
 k) $\frac{4}{51} - \frac{1}{51}i$. **3.11.** a) $a^2+4b^2 = (a-2bi)(a+2bi)$; k) $a^{2n}+b^{2k} = (a^n-ib^k)(a^n+ib^k)$. **3.12.** $i^n = \begin{cases} i, & \text{agar } n=4k+1, k=0,1,2,\dots \\ -1, & \text{agar } n=4k+2, k=0,1,2,\dots \\ -i, & \text{agar } n=4k+3, k=0,1,2,\dots \\ 1, & \text{agar } n=4k, k=0,1,2,\dots \end{cases}$ **3.13.** a) $13+21i$; d) $12i$; l) $8i$.

3.14. a) $12,5-12,5i$; f) $-3+1,8i$; m) i . **3.20.** $-\frac{1}{2} \pm \frac{\sqrt{3}}{2}i$. **3.21.** (78- rasm). **3.22.** (79- rasm). **3.23.** a) $|z|=5$; f) $|z|=3\sqrt{2}$; j) $|z|=1$; n) $|z|=4$; o) $|z|=|b|$;
 p) $|z|=1$. **3.24.** a) $\frac{\pi}{4}$; b) $\frac{\pi}{3}$; d) $\frac{\pi}{2}$; e) 0; f) $\frac{\pi}{6}$; g) $\frac{3\pi}{2}$; h) $\frac{3\pi}{4}$; i) $\frac{5\pi}{6}$; j) 0;
 k) $\frac{\pi}{2}$; l) π ; m) $\frac{3\pi}{2}$. **3.25.** a) $\sqrt{2}(\cos\frac{5\pi}{4} + i\sin\frac{5\pi}{4})$; b) $\sqrt{2}(\cos\frac{7\pi}{4} + i\sin\frac{7\pi}{4})$;
 d) $2(\cos\frac{\pi}{6} + i\sin\frac{\pi}{6})$; e) $2(\cos\frac{2\pi}{3} + i\sin\frac{2\pi}{3})$; f) $2(\cos\pi + i\sin\pi)$;
 g) $\cos\frac{\pi}{2} + i\sin\frac{\pi}{2}$; h) $\cos 0 + i\sin 0$; i) $\cos\pi + i\sin\pi$; j) $\sqrt{2}(\cos\frac{\pi}{4} + i\sin\frac{\pi}{4})$;
 k) $\cos\frac{2\pi}{3} + i\sin\frac{2\pi}{3}$; l) $\sqrt{11}(\cos\frac{\pi}{6} + i\sin\frac{\pi}{6})$; m) $\cos\frac{\pi}{6} + i\sin\frac{\pi}{6}$;
 n) $2(\cos\frac{\pi}{2} + i\sin\frac{\pi}{2})$. **3.26.** $-3-4i = 5(\cos(\pi + \arctg\frac{4}{3}) + i\sin(\pi + \arctg\frac{4}{3}))$.
3.27. $z=2(\cos\frac{7\pi}{4} - i\sin\frac{7\pi}{4})$. **3.28.** $z = \cos\frac{16\pi}{7} + i\sin\frac{16\pi}{7}$. **3.34.** $2(|u|^2 + |v|^2)$.





79- rasm.

- 3.35.** Ko'rsatma: a) $|z - (0 + 10i)| \leq 20$, $w = 0 + 10i = (0; 10)$. Javob: markazi $(0; 10)$ nuqtada joylashgan va radiusi $R = 20$ bo'lgan aylana bilan chegaralangan doira; b) $\text{Re}(z) = \text{Re}(x + yi) = x > 4$. Koordinata tekisligining barcha shunday nuqtalari to'plamiki, ular $x = 4$ to'g'ri chiziqdan o'ngda joylashgan bo'ladi; g) yechilishi: $z = x + yi$, $\text{Re } z = x$. U holda $\sqrt{x^2 + y^2} = x + 3$, yoki $x^2 + y^2 = x^2 + 6x + 9$, yoki $y^2 = 6x + 9$. Bu parabola, uchi $z = -1,5 + 0 \cdot i = -1,5$, o'qi parabola uchidan o'ng tomonda yotgan haqiqiy o'qning bir qismidan iborat. **3.36.** a) $\frac{\sqrt{2}}{2} \left(\cos \frac{3\pi}{8} + i \sin \frac{3\pi}{8} \right)$; b) $2 \left(\cos \frac{\pi}{45} + i \sin \frac{8\pi}{45} \right)$. **3.37.** a) $\frac{\sqrt{3}}{2} \left(\cos \frac{2\pi}{399} + i \sin \frac{2\pi}{399} \right)$; e) $\cos \frac{2\pi}{3} + i \sin \frac{2\pi}{3}$. **3.43.** a) $Z_0 = \frac{\sqrt[4]{8}}{2} \left(\cos \frac{\pi}{8} + i \sin \frac{\pi}{8} \right)$, $Z_1 = \frac{\sqrt[4]{8}}{2} \left(-\cos \frac{\pi}{8} - i \sin \frac{\pi}{8} \right)$; d) $Z_0 = \frac{\sqrt{3}}{2} + \frac{1}{2}i$, $Z_1 = -\frac{\sqrt{3}}{2} - \frac{1}{2}i$. **3.45.** $x = \sqrt[5]{r} \left(\cos \frac{\varphi + 2k\pi}{5} + i \sin \frac{\varphi + 2k\pi}{5} \right)$ ga $k = 0, 1, 2, 3, 4$ larni qo'yib, x_1, x_2, \dots, x_5 larni hisoblaymiz va $x_1 \cdot x_2 \cdot x_3 \cdot x_4 \cdot x_5 = r(\cos \varphi + i \sin \varphi)$ ni topamiz. **3.51.** a) $x \in R$; b) $x = -\frac{1}{2}(1+i)$; d) 1; e) 2. **3.52.** $x = -\frac{2}{3}$; $y = -\frac{28}{9}$. **3.53.** a) 2^{10} ; b) $-2^{10}(1-i)$. **3.58.** a) $x_{1,2} = \frac{b \pm \sqrt{4ac - b^2}}{2a}$; b) $Z_1 = \frac{1}{2} + \frac{\sqrt{3}}{2}i$, $Z_2 = -\frac{1}{2} - \frac{\sqrt{3}}{2}i$, $Z_3 = \frac{1}{2} - \frac{\sqrt{3}}{2}i$, $Z_4 = -\frac{1}{2} + \frac{\sqrt{3}}{2}i$.

IV bob

4.2. b) $\frac{1}{2^9 \cdot 7 \cdot 13}$; d) $2^9 \cdot 7 \cdot 13$. 4.3. e) 0; l) 45; m) 222. 4.5. a) $27x^6y^3z^3$; g) $243x^5z^{20}$. 4.6. e) $\frac{1}{27}$; h) $\frac{11}{13}$; i) $1\frac{3}{14}$. 4.8. a) $a^3 + x^2$; d) $5a - 12x$; i) $2x^3y - 2xz^2$. 4.12. b) $\frac{1}{2}$; e) 3; h) 41,472. 4.15. $a + b + c = 0 \Rightarrow c = -a - b \Rightarrow a^3 + b^3 + c^3 = a^3 + b^3 - (a + b)^3 = -3a^2b - 3ab^2 = 3ab(-a - b) = 3abc$.

4.17. $|a+b| = \begin{cases} |a|, & a \neq 0, b = 0 \text{ bo'lsa,} \\ |b|, & a = 0, b \neq 0 \text{ bo'lsa,} \\ 0, & a = b = 0 \text{ bo'lsa.} \end{cases}$ 4.22. a) $3^{1999} + 147$; e) 17. 4.23. b) $a = -7$;

e) $a = -17$. 4.24. a) 16; e) 84. 4.25. b) $a = 1, \forall b \in C$; e) $a = 0, b = 4$. 4.26. $a = 3, b = -7, c = 4$. 4.28. a) 12; d) 14. 4.30. a) $f(x)g(x) = 20x^5 + 16x^3 + 4x^2 + 8x$; e) $f(x)g(x) = 26x^5 + 73x^4 + 100x^3 + 33x^2 + 12$. 4.35. d) A, B, C lardan hech bo'lmasa birortasi 0 ga teng bo'lmashligi kerak, aks holda berilgan ko'phad 2-darajali bo'lmay qoladi. $A \neq 0$ bo'lsin. Ko'phadni $P(x; y) = Ax^2 + 2(By + D)x + (Cy^2 + 2Ey + F)$ ko'rinishda yozaylik. Uni ikkita chiziqli haqiqiy ko'paytuvchiga ajratish uchun $P(x) = 0$ tenglama ildizlarini bilish kerak:

$$x_{1,2} = \frac{-(By+D) \pm \sqrt{(By+D)^2 - A(Cy^2 + Ey + F)}}{A} = \frac{-(By+D) \pm \sqrt{(B^2 - AC)y^2 + 2(BD - AE)y + (D^2 - AF)}}{A}.$$

Bu ifoda noldan farqli aniq kvadrat bo'lgandagina izlanayotgan ko'paytma hosil bo'ladi. Buning uchun ushbu shartlar bajarilishi kerak: 1) $B^2 - AC > 0$; 2) $(BD - AE)^2 - (B^2 - AC)(D^2 - AF) = 0$. Qolgan hollarda ham ko'rsatilganlar kabi shartlar bajarilishi zarur va yetarli. 4.39. a) $a^8 + a^4 + 1$; b) $8xz$. 4.41. a) $P(x) = D(x)(x + 1) + 2$; b) $P(x) = D(x)(x^2 + 4x + 1) + 2$; d) $P(x) = D(x)(x^2 + 2x + 2) + 3x + 4$; e) $P(x) = D(x)(x^2 + 3x + 2) + 4x + 4$; f) $P(x) = D(x)(3x^2 + 5x - 8) - 5x^2 + 14x + 2$; k) $P(x) = D(x)(x^2 + 3x + 5)$; l) $P(x) = D(x)(x^3 + 4x)$. 4.42. a) $\frac{9}{10}x - \frac{9}{10}$; b) $x^2 + 1$; d) $x^3 + 1$; e) $x^2 - 2x + 2$; f) $x^3 - x + 1$; g) $x + 3$; h) $x^2 + x + 1$; i) 1. 4.43. $a = 4, b = 0$.

V bob

5.1. a) $4x^7$; b) $\frac{b^{28}}{243a^9}$; d) $4a^4b^2c^4$; e) $\frac{8}{3}x^2y^5z$. 5.3. a) {2}; b) \emptyset ; d) {1; 2}; e) {-3; 3}; f) $\left\{-\frac{3}{2}\right\}$; g) \emptyset ; h) {4,5}; i) {13}; j) {0; -2}; k) $\{-a; a\}$; l) {-4; 4}; m) {0; 5}; n) \emptyset ; o) {0; 3}; p) {-5; 9}; q) {1}. 5.4. a) $\{x | x \neq -2\}$; b) R ; d) $\{x | x \neq R, x \neq \pm 3\}$; i) $\{a | a \in R, a \neq 1, a \neq 2, a \neq 3\}$; k) $\{x | x \in R, x \neq \pm 4\}$; l) $\{x | x \in R, x \neq 1, x \neq 7\}$; n) R ; p) R . 5.5. a) $\{(x; y) | x \in R, y \in R, x \neq 0, x \neq y\}$; b) $\{(x; y) | x \in R, y \in R, |x| \neq |y|\}$; d) $\{(x; y) | x \in R, y \in R, y \neq x^2\}$; e) $\{(x; y) | x \in R,$

$y \in \mathbb{R}, x \neq 2, x \neq 3, y \neq 0$; g) $\{(x; y) \mid x \in \mathbb{R}, y \in \mathbb{R}, x \neq 0, y \neq 3x\}$; h) $\{(x; y) \mid x \in \mathbb{R}, y \in \mathbb{R}, x \neq \pm y\}$; l) $\{(x; y) \mid x \in \mathbb{R}, y \in \mathbb{R}\}$. **5.6.** a) $-\frac{a}{2}$; d) $\frac{x-2m}{x+2m}$; e) $\frac{2a+5}{a+2b}$; k) $\frac{1}{x+5}$; l) 1; m) x^2 . **5.7.** $\{3x^2+y; 3x^2 + \frac{1}{2}; 4a^2-x(a-3x); \frac{x^3}{4}; 6x - \frac{1}{2}\}$. **5.8.** a) $\frac{a-6}{6}$; b) $\frac{5x-3a}{4}$; d) $\frac{41a-5}{12}$; e) $\frac{a^2+x^2}{2a}$; f) $-\frac{x^2+c^2}{2x}$. **5.9.** a) $\frac{a+x}{x}$; b) $\frac{2y-x}{y}$; d) $-\frac{2a+x}{ax}$; f) $\frac{x-5}{5x}$. **5.10.** d) $\frac{2x}{(1-3a)(x+2)}$; e) $\frac{7x^2}{(2x-1)(2y+3)}$. **5.11.** a) $\frac{y(x-y)}{x^2}$; b) $\frac{a(a+b)}{3b}$; g) $-\frac{a}{xyb}$; m) $\frac{-ax}{x+3}$. **5.12.** d) $\frac{b}{4a}$; f) $\frac{(x+3)(x+2)}{6}$; i) $9c^2 - b^2$. **5.14.** b) $-2x$; d) $q^2 - pq$; e) $-\frac{1}{4x}$; f) $\frac{10}{x}$; g) 2; h) $2x(x+y)$; i) $a - 2$. **5.15.** a) $\frac{1}{x^2+x+1}$; b) $\frac{1}{x^7+1}$; d) $\frac{a}{xy}$; e) $\frac{x^{11}-1}{x^{11}}$. **5.16.** 1 va 9. **5.19.** d) $\frac{1-x}{1+2x}$. **5.20.** a) ha; b) yo'q; d) ha; e) yo'q; f) yo'q; g) ha; h) yo'q; i) ha. **5.21.** a) $x \in \mathbb{Q}$; b) $\{(x \mid x = 2k, k \in \mathbb{Z})\}$; d) $x \geq -8$; e) $x \in \mathbb{R}$; f) $x > 0$; g) $x \in \mathbb{R}$; h) $x \in [-1; 1]$; i) $x \neq \pm 1$. **5.23.** g) 1989; h) $\frac{1}{8}$. **5.24.** a) $c^{\frac{2}{3}}$; b) \sqrt{b} ; d) m ; e) y^3 . **5.26.** a) $x \leq 0$; b) $x \in \mathbb{R}$; d) $x \in \mathbb{R}$; e) $x \in \mathbb{R}$; f) $x \in \mathbb{R}$; g) $x \in \mathbb{R}$; h) $x \geq 0$; i) $x \in \mathbb{R}$; j) $x \in \emptyset$; k) $x \in \mathbb{R}$; l) $x \in \mathbb{R}$; m) $x = 3$. **5.27.** a) $x \leq 2$; b) $x \geq -3$; d) $x \geq 3$; e) $x \leq 4$; f) $x = 3$; g) $x = 3$; h) $x \in \emptyset$; i) $x = 1$; j) $x = -8$; k) $x = 8$; l) $x \in \{2; 4\}$; m) $x = 3$. **5.28.** a) 44; b) -15; d) 6; e) 6; f) 630; g) 120; h) 60; i) 0,015. **5.29.** a) $\frac{6}{7}$; b) $-\frac{4}{3}$; d) $\frac{2}{3}$; e) $\frac{3}{2}$; f) $\frac{5}{8}$; g) $\frac{4}{5}$; h) $\frac{3}{5}$; i) $\frac{1}{3}$. **5.30.** a) 225; b) 225; d) -25; e) $\frac{1}{9}$; f) x ; g) x^3 ; h) $x^2 + 1$; i) x^3 . **5.31.** a) $\sqrt[3]{16}$; b) $\sqrt[12]{76}$; d) $\sqrt[15]{4}$; e) $\sqrt[2]{25}$; f) $\sqrt[2]{x^2}$; g) \sqrt{x} ; h) $\sqrt[12]{x}$; i) $\sqrt[9]{x}$. **5.32.** a) $\sqrt[4]{8}$; b) 4; d) $\sqrt[3]{-32}$; e) 2; f) $\sqrt[4]{x^3}$; g) x^4 ; h) $\sqrt[4]{(x+2)^5}$; i) x^8 . **5.33.** a) $\sqrt[6]{27}$ va $\sqrt[6]{16}$; d) $\sqrt[4]{25}$ va $\sqrt[4]{6}$; i) $\sqrt[20]{(x-y)^4}$ va $\sqrt[20]{y^5}$. **5.34.** f) $7\sqrt{2}$; h) $2\sqrt[4]{3}$; j) $|x^2 - 2|\sqrt{y}|$; l) $(x-1)\sqrt[7]{z^2}$; m) $(y+1)^2\sqrt[5]{x^2}$. **5.35.** a) $\sqrt{80}$; b) $\sqrt[3]{-54}$; d) $-\sqrt[4]{162}$; e) $\sqrt[3]{96}$; f) $-\sqrt{x^2y^3}$; g) $-\sqrt[5]{x^5y^3}$; h) $\sqrt[4]{x^8y^3}$; i) $-\sqrt[4]{x^{12}y^5}$; j) $\sqrt[4]{(x-1)^8(y-2)}$; k) $-\sqrt[4]{(x-1)^{12}(y-2)}$; l) $-\sqrt{x^4y}$; m) $-\sqrt{(7-4\sqrt{3})xy^3}$. **5.36.** a) $\sqrt{2}$; b) $6\sqrt[3]{3}$; i) $2\sqrt[4]{8}$. **5.38.** a) $2\sqrt{3} < 3\sqrt{2}$; e) $3\sqrt[3]{4} > 3\sqrt[3]{2}$; f) $\sqrt{2} < \sqrt[3]{3}$; h) $\sqrt{8} < \sqrt[3]{19}$.

5.39. a) 20; b) $2\sqrt[12]{2}$; f) 6; i) $\sqrt[4]{12}$. 5.40. a) $\sqrt[6]{2}$; b) $\sqrt[3]{4}$; d) $\sqrt{6}$; e) $\sqrt[12]{\frac{16}{27}}$;
 f) $\sqrt[12]{\frac{1}{a}}$; g) $\sqrt[18]{a}$. 5.41. a) $x\sqrt[3]{16x}$; b) $24x^2$; d) $36x^2 - 9$, $|x| \geq \frac{1}{2}$; e) x^{16} ;
 g) $\sqrt[3]{(2+xy^2)^2}$; h) $(xy+z)\sqrt{xy+z}$. 5.42. a) $\frac{2\sqrt{3}}{3}$; b) $\frac{5}{6}\sqrt[3]{18}$;
 d) $5+2\sqrt{6}$; e) $2-\sqrt{2}+\sqrt{6}$; f) $4+\sqrt[3]{75}+\sqrt[3]{45}$; l) $\frac{2(\sqrt{a}-\sqrt{x})}{a-x}$;
 n) $\frac{(x-y)\sqrt{x+y}}{x+y}$; o) $(1+\sqrt{a})\sqrt{1-\sqrt{a}}$. 5.43. a) $\sqrt{37}-\sqrt{2}$; b) $\sqrt{23}-\sqrt{6}$; d) 2;
 e) $2\sqrt{5}$. 5.44. a) to'g'ri; b) to'g'ri; d) to'g'ri; e) to'g'ri. 5.45. e) $\sqrt[4]{18}+\sqrt[4]{2}$.
 5.46. 2. 5.47. a) $a\sqrt[4]{b}(\sqrt[4]{a}+\sqrt[4]{b})$; b) 27; d) -1, agar $0 < a \leq 1$ va
 $-\left(\frac{\sqrt{1-a^2}+1}{a}\right)^2$, agar $-1 < a < 0$; e) 3; f) $\sqrt[6]{a}$; g) $9a$; h) $\frac{x^2}{2x-1}$; i) $\sqrt[3]{(a-b)^2}$.
 5.48. 1. 5.49. 4.

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6.2. a) $X = R \setminus \{0; \pm 1\}$, $x = -2$. 6.3. a) $\frac{a-1}{3}$; b) $a = 1$ da yechim yo'q, $a \neq 1$ da
 $\frac{5}{a-1}$; e) $a = \pm 1$ da x ixtoriy son, $a \neq \pm 1$ da $x = 0$. 6.5. Yo'q. 6.6. Yo'q. 6.7. 15
 yildan keyin. 6.8. a) -4,5; b) istalgan son; d) -1; e) ildizi yo'q. 6.10. a) $a \neq 1$
 da $x = a - 1$, $a = 1$ da x - istalgan son; b) $a \neq \pm 1$ da $x = 0$, $a \neq \pm 1$ da x - istalgan
 son; g) $a \neq 1$ da $x = \frac{b+1}{a-1}$; $a = 1$, $b = -1$ da x - istalgan son; $a = 1$, $b \neq -1$ da ildizi
 yo'q. 6.12. f) $(x-3)^2 - 1$; g) $a(x-2a)^2 + 3$; i) $\left(x + \frac{a+b}{2}\right)^2 - \frac{(a-b)^2}{4}$. 6.15.
 Mumkin emas. Ko'rsatma: $z^2 - 15z + 70 = 0$ tenglama haqiqiy ildizga ega
 emasligidan foydalaning. 6.16. Ko'rsatma: $a^2 + b^2 = (a+b)^2 - 2ab$, $a^3 + b^3 =$
 $= (a+b)^3 - 3ab(a+b)$. 6.17. Yo'q. 6.20. i) $a(x^2 - (\alpha + \beta)x + \alpha\beta) = 0$, $a \in R$, $a \neq 0$. 6.21.
 $14x^2 - 3x - 5 = 0$. 6.22. $\frac{1}{2}x^2 - \frac{1}{2}x - 3 = 0$. 6.23. -4,5. 6.24. 1. 6.25. 15. 6.26. $x = 5$.
 6.27. $x \in R$, $x \neq \frac{2}{3}$. 6.28. $x \in R$, $x \neq -2$. 6.29. \emptyset . 6.30. $a \neq -c$, $c \neq 0$ da $x = \frac{a-c}{a+c}$,
 $a = -c$, $c = 0$ da \emptyset . 6.31. $a \neq 1$, $a \neq 2,25$, $a \neq -0,4$ da $x = \frac{31-2a}{4a-9}$; $a = 2,25$, $a = -0,4$
 da \emptyset ; $a = 1$ da ma'noga ega emas. 6.32. $-\frac{11}{7}$ va 2. 6.33. -4 va 9. 6.34. 0 va 1. 6.35. 1.
 6.43. Ko'rsatma: $a^3 + b^3 = (a+b)^3 - 3(a+b)ab$ tenglikdan foydalanib, o'ng
 tomonni $b^3 - 3b$ ko'rinishda tasvirlang (bu yerda $b = a + \frac{1}{a}$) va tenglamani
 $x^3 - b^3 = 3(x-b)$ tenglama bilan almashtiring. 6.44. -1; 1; 8. 6.53. -1; 2. 6.54. -2;
 1. 6.55. $y = x^2 + 6x + 1$ ga nisbatan kvadrat uchhad sifatida qarang. 6.56. $y = (x^2 -$

$-x + 1)^2$ ga nisbatan kvadrat uchhad sifatida qarang. **6.57.** Ko'rsatma: $2 \cdot \frac{x^2+36}{x^2-36} = \frac{x+6}{x-6} + \frac{x-6}{x+6}$. **6.58.** -4; -2; -1. **6.59.** 1; $\frac{-1 \pm \sqrt{17}}{2}$. **6.60.** Ko'rsatma: $40 = 8 + 32$. **6.63.** -1 va 6. **6.69.** 0, 2, $1 \pm \sqrt{2}$. **6.72.** Ko'rsatma: $x^2 - 5x + 6 = t$ deb oling. **6.73.** Ko'rsatma: $x^2 + 5x = t$ deb oling. **6.77.** \emptyset . **6.78.** 5,5 va 6. **6.79.** -5; 1; $-1 \pm \sqrt{6}$. **6.80.** ± 2 ; $\pm \frac{\sqrt[4]{24}}{2}$. **6.81.** Ko'rsatma: $x^2 + 2x = t$ deb oling. **6.82.** -4; 2.

6.113. $\left[1; \frac{4}{3}\right]$. **6.114.** $(-\infty; -1] \cup [15; +\infty)$. **6.115.** $[-2; 1]$. **6.116.** R . **6.117.** \emptyset . **6.118.** $[-1; 1]$. **6.119.** R . **6.120.** $\{1\} \cup [2; 3]$. **6.121.** $x = -5/2$. **6.122.** $x = \pm 2$. **6.125.** $x = 4/3$.

6.126. $x = 4,5$; $x = 3,25$. **6.127.** $x = \frac{\sqrt{113}-5}{4}$. **6.128.** $x = -\frac{2}{3}$. **6.129.** $(-\infty; 2/3]$. **6.130.** $[1; 3]$. **6.131.** $x = 0,5$, $x = 3,5$. **6.132.** $[2; +\infty)$. **6.133.** a) $x = 2$; $x = -6$. **6.134.** $\left[-2; 1\frac{2}{3}\right]$. **6.135.** $\{0\} \cup (1; +\infty)$. **6.136.** $(-\infty; 0] \cup \{1; +\infty)$. **6.137.** $\left[-2\frac{1}{6}; 1\frac{1}{6}\right]$. **6.138.** $\left[\frac{5}{6}; +\infty\right)$. **6.139.** $[0; 13]$. **6.140.** $\{-4; -2; 0; 2; 4\}$. **6.141.** $[-3; 3]$. **6.142.** $(-\infty; 0] \cup \left[\frac{1}{2}; +\infty\right)$. Ko'rsatma: $|a-b| = |a| - |b| \Leftrightarrow (a-b), b \geq 0$. **6.143.** $\{0\}$.

6.144. $\{0; 2\}$. **6.145.** $\{0\}$. **6.146.** $\{-1\}$. **6.148.** $a \leq 0$ da $x = -a$; $a > 0$ da $x = -7$, $x = a$. **6.149.** $a > 0$ da $\{-3a; a\}$; $a = 0$ da $x \neq 0$; $a < 0$ da \emptyset . **6.150.** $a \neq 0$ da $\left\{-\frac{5a}{3}\right\}$; $a = 0$ da $(-\infty; +\infty)$; **6.151.** $a \leq 0$ da $x = \frac{6a}{5}$; $a > 0$ da $x = \pm 2a$. **6.156.** $m = \pm\sqrt{15}$. **6.157.** $m \neq 2$ bo'lsa. **6.158.** $a = b = -3$. **6.159.** $m = 1$, $n = -30$. **6.160.** $2x + 1$. **6.161.** $\frac{r_1 - r_2}{a - b} x + \frac{r_1 b - r_2 a}{b - a}$. **6.162.** b) $P(x) = D(x)(x^2 - x + 3)$; d) $P(x) = D(x)(2x^3 - 2x^2 - x - 4) + 6$; h) $P(x) = D(x)(x^3 - 3x^2 + 8x - 21)$; m) $P(x) = D(x)(x^4 - x^3 - 3x^2 - x - 1) - 4$. **6.163.** a) 2; b) 0; d) 3. **6.164.** $a^3 + b^3 + c^3 - 3abc = (a + b + c)(a^2 + b^2 + c^2 - ab - bc - ac)$. Ko'rsatma: $a^3 + b^3 + c^3 - 3abc$ ni a ga nisbatan ko'phad deb qarang va $a = -b - c$ soni shu ko'phadning ildizi ekanini tekshirib ko'ring. **6.165.** b) $x = 2 \pm i$; e) $x = -2 \pm 3i$; g) $x = 4 \pm 5i$; i) $x = -0,5 \pm i$; k) $x = 1 \pm \frac{1}{4}i$; m) $x = 3 \pm \sqrt{2}i$. **6.166.** a) $(x + 1 - 2i)(x + 1 + 2i)$; b) $(x - 1 - 3i)(x - 1 + 3i)$; e) $(5z + 5 - i)(5z + 5 + i)$. **6.167.** a) $\pm 3i$; ± 2 ; h) $z_{1,2} = \pm \frac{1+i\sqrt{3}}{2}$, $z_{3,4} = \pm \frac{1-i\sqrt{3}}{2}$. **6.168.** $ax^2 - 4ax + 13a = 0$, $a \neq 0$, $a \in R$. **6.169.** $ax^4 - 8ax^3 - 34ax^2 - 72ax - 65 = 0$, $a \neq 0$, $a \in R$. **6.171.** 3 karrali. **6.172.** a) $(x^2 + 3)(x^2 - 3x + 3)(x^2 + 3x + 3)$; b) $x^2(x - 4i)(x + 4i)$. **6.173.** a) 2; b) -5; 3; 6 d) ratsional ildizi yo'q; e) $\frac{1}{2}$; f) $\frac{1}{2}$; $-\frac{3}{2}$; g) -1; h) -3; 2. **6.174.** a) -2; 1; b) -4; -2; -1; d) butun yechimlari yo'q. **6.175.** a) -2, $\pm\sqrt{3}$, $\frac{1}{2}$; b) $\frac{1 \pm \sqrt{5}}{2}$, $-\frac{1}{2}$, 2; d) 1; e) ± 1 , $\frac{3 \pm \sqrt{73}}{8}$; f) ± 1 , $-\frac{2}{3}$, 2; g) ± 1 ,

$\frac{7 \pm \sqrt{73}}{4}$. **6.177.** a) 0,79998; b) 0,03490482872567; d) -0,324617. **6.180.** $(-\infty; -1)$.
6.181. $(-4; 6; +\infty)$. **6.182.** $(2 \frac{13}{15}; +\infty)$. **6.183.** $(-\infty; 2 \frac{28}{29})$. **6.184.** $(-\infty; -1,5)$.
6.185. $(-\infty; 3)$. **6.186.** $[1; +\infty)$. **6.187.** $(-\infty; -\frac{2}{3}]$. **6.188.** $(3; +\infty)$. **6.189.** $(-\infty; -2)$.

6.190. $(-\infty; -1 \frac{2}{3})$. **6.202.** $y > \frac{3}{a^2+1}$. **6.205.** $\begin{cases} a > 0 \text{ da } x < \frac{b}{a}, \\ a = 0, b \leq 0 \text{ da } \emptyset, \\ a = 0, b > 0 \text{ da } x \in R, \\ a < 0 \text{ da } x > \frac{b}{a}. \end{cases}$ **6.214.**

a) $y < 3$ da; b) $y > 7$ da; d) $y > \frac{3}{17}$; e) $y < 0,1$ da. **6.215.** $a \in (5/3; \infty)$.

6.218. $\begin{cases} k > 0 \text{ da } x \in \left(-\infty; \frac{1-\sqrt{1+4k}}{2k}\right) \cup \left(\frac{1+\sqrt{1+4k}}{2k}; \right), \\ k = 1 \text{ da } x \in (-\infty; -1), \\ -\frac{1}{4} < k < 0 \text{ da } x \in \left(\frac{1-\sqrt{1+4k}}{2k}; \frac{1+\sqrt{1+4k}}{2k}\right), \\ k \leq -\frac{1}{4} \text{ da } \emptyset. \end{cases}$

6.220. $\begin{cases} |k| > 2\sqrt{6} \text{ da } x \in \left(\frac{-k-2\sqrt{6}}{4}; \frac{-k+2\sqrt{6}}{4}\right), \\ |k| \leq 2\sqrt{6} \text{ da } \emptyset. \end{cases}$

6.221. $\begin{cases} k < 1 \text{ da } x \in (-\infty; 1 - \sqrt{1-k}) \cup (1 + \sqrt{1-k}; +\infty), \\ k = 1 \text{ da } x \in (-\infty; 1) \cup (1; +\infty), \\ k > 1 \text{ da } x \in (-\infty; +\infty). \end{cases}$

6.229. $x \in (-\infty; +\infty)$. **6.231.** $x \in (-\infty; 1) \cup (3; +\infty)$. **6.232.** $x \in \left(-\infty; -\frac{1}{3}\right) \cup (2; +\infty)$. **6.235.**

$x \in (-\infty; +\infty)$. **6.236.** $x \in (2; 5) \cup (12; +\infty)$. **6.237.** $x \in (-\infty; -7) \cup (-1; 4)$. **6.238.** $x \in (-\infty; -5) \cup (-1; 0) \cup (8; +\infty)$. **6.239.** $x \in (-48; 37) \cup (42; +\infty)$. **6.240.** $x \in (-\infty; -0,7) \cup (2,8;$

$9,2)$. **6.241.** $x \in (-17; -4) \cup (4; +\infty)$. **6.242.** $x \in (-\infty; -11) \cup \left(\frac{2}{3}; 11\right)$. **6.243.** $x \in (-\infty;$

$-5) \cup (0; 5)$. **6.244.** $x \in (-0,1; 0) \cup (0,1; +\infty)$. **6.245.** $x \in (-\infty; -3) \cup (-1; 1) \cup (3; +\infty)$.

6.246. $x \in (-6; 0) \cup (6; 15)$. **6.247.** $x \in (-2; 6)$. **6.248.** $x \in (-\infty; 0) \cup (4; +\infty)$. **6.249.**

$x \in (-\infty; 1) \cup (1; 24)$. **6.250.** $x \in (-\infty; -7) \cup (21; +\infty)$. **6.251.** $x \in (-\infty; -4) \cup (8; +\infty)$. **6.252.**

$x \in (-16; 11)$. **6.253.** $x \in [-1; 3)$. **6.254.** $x \in (-\infty; -4) \cup [6; +\infty)$. **6.255.** $x \in (-\infty; 1) \cup (1; 2) \cup$

$(4; +\infty)$. **6.256.** $x \in (-\infty; -1) \cup \{1; 2\} \cup [4; +\infty)$. **6.257.** $x \in \{-2\} \cup [1; 2]$. **6.261.**

$x \in (-\infty; 1)$. **6.262.** $(-\infty; -2) \cup (-2; 1) \cup (4; +\infty)$. **6.263.** $x \in (-\infty; -5] \cup \{1\} \cup [2;$

$7) \cup (7; +\infty)$. **6.276.** $(-\infty; +\infty)$. **6.277.** $(2; 3)$. **6.278.** $(-3; 1)$. **6.279.**

$(-\infty; -2) \cup \left(-2; \frac{1}{2}\right) \cup (1; +\infty)$. **6.280.** $(-2; -1) \cup (1; 2)$. **6.281.** $[-3; 3]$. **6.282.**
 $(-\infty; 2) \cup (5; +\infty)$. **6.283.** $(-\infty; 1)(1,5; +\infty)$. **6.284.** $(-\infty; 2,5) \cup \left(\frac{33}{8}; +\infty\right)$. **6.285.**
 $(-6; 3)$. **6.286.** $(-\infty; 1) \cup (4; +\infty)$. **6.287.** $(-3; 1)$. **6.288.** $(-\infty; 0) \cup (3; +\infty)$. **6.290.**
 $(-\infty; +\infty)$. **6.291.** $\left(-\frac{1}{2}; 2\right)$. **6.299.** $(-\infty; -3) \cup \left(-\frac{\sqrt{7}}{2}; \frac{\sqrt{7}}{2}\right) \cup (4; +\infty)$. **6.300.**
 $[1; 2) \cup (3; 4]$. **6.302.** $(-\infty; 1) \cup (1; +\infty)$. **6.303.** $(-\infty; -2) \cup (-1; 0) \cup \left(\frac{1}{2}; +\infty\right)$. **6.306.**
 $(-\infty; -4] \cup [-2; -1]$. **6.307.** $(-2; -1) \cup (2; 3)$. **6.318.** $\{1\}$. **6.319.** $\left\{\frac{3}{2}\right\}$. **6.320.** $(-\infty; +\infty)$.
6.321. $x=4$. **6.322.** $(-\infty; +\infty)$. **6.323.** $(-\infty; 4) \cup (4; +\infty)$. **6.324.** $\{\pm 1\}$. **6.325.** $(-\infty; 1) \cup$
 $\cup (-1; 1) \cup (1; +\infty)$. **6.326.** $R \setminus \{2\}$. **6.327.** $[-1; 1]$. **6.328.** $(-\infty; +\infty)$. **6.329.** $[0; 3]$.
6.330. $(2; 4)$. **6.331.** $(-\infty; 1) \cup (3; +\infty)$. **6.332.** $\left(-\infty; -\frac{2}{3}\right] \cup \left[\frac{1}{2}; +\infty\right)$. **6.333.**
 $\left(\frac{11-\sqrt{57}}{4}; \frac{11+\sqrt{57}}{4}\right)$. **6.334.** $(8; +\infty)$. **6.335.** $(-3; 4)$. **6.336.** $(-\infty; -2) \cup (-1; +\infty)$. **6.338.**
 $[1; 6]$. **6.339.** \emptyset . **6.340.** $(-\infty; -3]$. **6.341.** $\left[-2; 3\frac{2}{3}\right]$. **6.342.** $[-3; 5]$. **6.343.**
 $\left(-\frac{4}{7}; +\infty\right)$. **6.344.** $(-\infty; 1) \cup (7; +\infty)$. **6.345.** $(-\infty; 1)$. **6.346.** $(-\infty; 2) \cup (3,5; +\infty)$.
6.347. $(-\infty; 1] \cup [3; +\infty)$. **6.348.** $(-\infty; -1) \cup (0; 1) \cup (1; +\infty)$. **6.349.** $(2; 3) \cup (3; +\infty)$.
6.350. $(-\infty; -6) \cup [-3,5; +\infty)$. **6.351.** $\left(3; 3\frac{1}{3}\right)$. **6.352.** $\left[0; 1\frac{3}{5}\right] \cup [2,5; +\infty)$.
6.353. $(-\infty; -2) \cup (-2; -1) \cup (1; 0]$. **6.354.** $(-\infty; 2)$. **6.355.** $[\sqrt{6}-2; 1) \cup (1; 4]$. **6.356.**
 $(-\infty; 1) \cup [5; +\infty)$. **6.359.** $\left(-\infty; \frac{1+\sqrt{17}}{4}\right]$. **6.360.** $(-3; 3]$. **6.361.** $(1-\sqrt{3}; 2-\sqrt{2})$.
6.362. $\left(-\infty; \frac{4-\sqrt{19}}{3}\right) \cup \left(\frac{4-\sqrt{19}}{3}; +\infty\right)$. **6.380.** a) $(4; -1)$; b) $\left(\frac{9}{11}; \frac{7}{11}\right)$; d) $(t; 5-t)$,
 $t \in R$; e) $(4; -3)$; f) $(6; 9)$; g) \emptyset . **6.381.** a) $(1; 2)$; b) \emptyset ; d) $\left(t; \frac{7-2t}{3}\right)$,
 $t \in R$; e) $\left(\frac{27}{8}; -\frac{19}{12}\right)$; f) $\left(\frac{7}{11}; \frac{3}{13}\right)$. **6.382.** a) $(1; 1; -1)$; b) $(1; -1; 1)$; d) $(-1;$
 $1; 1)$; e) $(1; 1; 1)$; f) $(1; -1; -1)$; g) $(-1; -1; 1)$. **6.383.** a) $(1; 0)$, $(0; -1)$; b) $(-1;$
 $1)$, $\left(\frac{9}{8}; -\frac{1}{8}\right)$; g) $\left(\frac{11}{2}; 5\right)$, $(3; -5)$. **6.384.** a) $(2; 3)$, $(3; 2)$; e) $(2; -3)$,
 $(3; -2)$. **6.385.** a) \emptyset ; b) \emptyset ; d) $(1-t; t)$, $t \in R$. **6.386.** a) $(-2; -4)$, $(-4; -2)$, $(2;$
 $4)$, $(4; 2)$; b) $(2; 8)$, $(8; 2)$, $(-2; -8)$, $(-8; -2)$; d) $\left(-\frac{9}{5}; -\frac{16}{5}\right)$, $\left(\frac{9}{5}; \frac{16}{5}\right)$;
e) $(-3; -2)$, $(3; 2)$; f) $(-7; -3)$, $(7; 3)$; h) ko'rsatma: bir jinsli tenglama
hosil qiling; h) $(-3; -2)$, $(3; 2)$. **6.387.** a) $(1; 2)$, $(2; 1)$; b) $(-3; -5)$,
 $\left(-\frac{5}{3}; -\frac{13}{3}\right)$, $\left(\frac{5}{3}; \frac{13}{3}\right)$, $(3; 5)$; d) $(-4; -5)$, $(-3\sqrt{3}; -\sqrt{3})$, $(3\sqrt{3}; \sqrt{3})$, $(4;$

5); e) (1; -1), (3; -3), $\left(\sqrt{157} - 13; \frac{\sqrt{157}-13}{2}\right)$, $\left(-13 - \sqrt{157}; -\frac{13+\sqrt{157}}{2}\right)$;
f) (2; -3), (t; 1), $t \in R$; g) (-1; 3), (t; 2), $t \in R$; h) (2; -1), (-1; t), $t \in R$;
i) (-1; -2), $(-\sqrt{2}; -\sqrt{2})$, (1; 2), $(\sqrt{2}; \sqrt{2})$. **6.388.** a) (-1; 6), (6; 1), (-1; 5), (-5; 1); b) $(1 + \sqrt{2}; -1 + \sqrt{2})$, $(1 - \sqrt{2}; -1 - \sqrt{2})$, (-1; -2), (2; 1); d) (-2; -4), $\left(\frac{5}{3}; \frac{10}{3}\right)$; e) (1; 4), (-5; -4), (5; -4), (-1; -4). **6.389.** a) (2; 3), (3; 2); b) (-3; -1), (-1; -3), (1; 3), (3; 1); d) (-1; -2), (2; 1); e) (2; -1), (-1; 2); f) (-1; 2), (-2; -1). Ko'rsatma: ikkinchi tenglamani 3 ga ko'paytirib, birinchi tenglamaga qo'shing; g) (-3; -2), (-2; -3), (2; 3), (3; 2). Ko'rsatma: birinchi tenglamadan $x^2 + y^2 = \frac{78}{xy}$ ekani topiladi. Bu tenglamani kvadratga ko'taring; h) (4; 8), (8; 4). **6.390.** a) (1; 3; 9), (9; 3; 1); b) $\left(\frac{12}{7}; \frac{12}{5}; -12\right)$; d) $\left(\frac{1}{\sqrt[3]{3}}; \frac{1}{\sqrt[3]{3}}; \frac{1}{\sqrt[3]{3}}\right)$; e) $\left(0; \frac{1}{\sqrt{2}}; -\frac{1}{\sqrt{2}}\right)$, $\left(0; -\frac{1}{\sqrt{2}}; \frac{1}{\sqrt{2}}\right)$. **6.392.** a) -15; b) 3; f) 0; g) 0; h) 1; i) $x^2(x^2 - 1)$. **6.393.** a) $a = 6$; b) $a = -2$; d) 0; e) a - ixtiyoriy son. **6.394.** a) ± 2 ; b) 0; d) 2. **6.396.** d) $x \in R$; e) $x \in R$. **6.397.** a) $8\frac{172}{495}$; b) 3, (13). **6.398.** a) -80; b) 6; d) -72; e) 0; f) 36; g) -90. **6.399.** a) $\frac{2}{3}$; b) 0 va 6; e) \emptyset . **6.400.** a) -23; b) 6; d) $2a + 5$; e) $-4a + 13b$. **6.401.** a) $\Delta_x = 20$; $\Delta_y = 13$; e) $\Delta_x = 35$; $\Delta_y = -30$. **6.402.** a) (-5; 2); b) (2; 1); d) (6; 5); e) (5; -2); f) \emptyset ; g) \emptyset ; h) \emptyset ; i) \emptyset ; j) (t; t - 1), $t \in R$; k) $\left(t; \frac{3t}{5}\right)$, $t \in R$; **6.405.** $a = 1$, $b = -1$. **6.406.** a) (1; -1), (1; -2), (-1; -1), (-1; 2). **6.407.** $a = 4$. **6.408.** $a = 3$. **6.409.** a) \emptyset ; e) $\left(3 - 2y; y; \frac{3y+1}{2}\right)$, $y \in R$. **6.410.** $a \in \left[\frac{2}{3}; 3 - \sqrt{5}\right]$ da $\left(\frac{4a-a^2}{2a-4}; \frac{a-4}{a-2}\right)$, $a \in (3 - \sqrt{5}; 2]$ da $\left(\frac{a^2-12a+8}{6a-4}; \frac{a}{3a-2}\right)$. **6.411.** $a = 7 - 4\sqrt{3}$ da $(0; 1 - 2\sqrt{3})$, $a = 7 + 4\sqrt{3}$ da $(0; 1 + 2\sqrt{3})$, $a = 1$ da (6; -11). **6.412.** 28 m. **6.413.** 2,5 t. **6.414.** 8 kunda. **6.415.** 21 qator. **6.416.** 20 km/soat. **6.417.** 20 km/soat. **6.418.** 7 km/soat. **6.420.** 5 soat, 7 soat. **6.421.** 30 kunda, 20 kunda. **6.423.** 18 km/soat, 24 km/soat. **6.425.** 11 ta. **6.426.** 22 kishi. **6.427.** 30 o'quvchi. (Eslatma: 12. 13- masalada 42 ta vektor hosil bo'ladi.) **6.428.** 7 ta. **6.429.** Sakkizburchak. **6.430.** 40 km/soat. **6.431.** 30 km/soat. **6.432.** 10 sm va 4 sm. **6.433.** 15 sm; 8 sm. **6.435.** 12 sm; 16 sm; 20 sm. **6.436.** 36; 4. **6.437.** 40 km/soat; 30 km/soat. **6.438.** 36 km/soat; 24 km/soat. **6.439.** 36 km/soat; 30 km/soat. **6.440.** 10 soat; 6 soat. **6.441.** 60 soat; 84 soat. **6.422.** 18 va 12. **6.443.** a) $\left(-5; -\frac{3}{2}\right) \cup \left(\frac{1}{2}; 1\right)$; b) $\left[-\frac{1}{2}; \frac{1}{2}\right]$; d) (0; 1); e) (-4;

$-3) \cup [-2; -1] \cup [1; 2)$. **6.451.** \emptyset . **6.452.** \emptyset . **6.453.** \emptyset . **6.454.** \emptyset . **6.455.** \emptyset . **6.456.** \emptyset .
6.457. \emptyset . **6.458.** \emptyset . **6.459.** \emptyset . **6.460.** \emptyset . **6.461.** \emptyset . **6.462.** $x=3$. **6.463.** $x=0,5$. **6.464.** \emptyset .
6.465. $\left\{\frac{1}{2}; 1\right\}$. **6.466.** $\{-1; 2\}$. **6.467.** $\{-3; 2\}$. **6.468.** $\{-4; 3\}$. **6.469.** $x=3$. **6.470.** $x=3$.
6.471. $x=8$. **6.472.** $x=28$. **6.473.** $x=0$. **6.474.** $x=4$. **6.475.** $x=19$. **6.476.** $x=3$.
6.477. $x=6$. **6.478.** $x=-1$. **6.479.** \emptyset . **6.480.** $x=2$. **6.482.** $x=2, x=-4$. **6.483.**
 $x_1 = 1 + \sqrt{3}; x_2 = 1 - \sqrt{3}$. **6.484.** $x=-5, x=0$. **6.485.** $x_1 = 1, x = -\frac{27}{8}$. **6.486.**
 $-8; 27$. **6.487.** $8; 27$. **6.488.** $x=3$. **6.489.** $x=1$. **6.490.** $\left\{-\frac{3}{2}; \frac{1}{2}\right\}$. **6.491.** $x=2,5$. **6.492.**
 $x=8$. **6.493.** $x=5$. **6.494.** $x = \frac{7 \pm \sqrt{153}}{16}$. **6.495.** $x=2$. **6.496.** $x=3$. **6.497.** \emptyset . **6.498.**
 $x=-61, x=30$. **6.499.** $x=8, x=8 \pm 4\sqrt{3}$. **6.500.** $x=-6, x=-5, x=-\frac{11}{2}$.
6.501. $x=-1$. **6.502.** $x=0$. **6.503.** $x=4$. **6.504.** $x=0$. **6.505.** $x=9$. **6.506.** $x=2; x=3$.
6.507. $x=-61, x=30$. **6.508.** $x=-2\frac{2}{3}, x=1$. **6.509.** $x=-\frac{1}{3}, x=1$. **6.510.** $x=$
 $=\pm 4$. **6.511.** $x=-1$. **6.512.** $x=4$. **6.513.** \emptyset . **6.514.** $x=-1, x=4$. **6.515.** $[2; +\infty)$.
6.516. $[5; 8]$. **6.517.** $x=-\frac{1}{11}$. **6.518.** $x=\frac{5}{11}$. **6.519.** $x=\frac{\sqrt{5}}{2}$. **6.520.** $x=2$. **6.521.**
 $\frac{\sqrt{5}}{2}$. **6.522.** $a < 0$ da \emptyset , $a \geq 0$ da $x=a^2-1$. **6.523.** $a < -3$ da \emptyset , $a \geq -3$ da $x=\frac{a-3}{2}$.
6.524. $a \neq 0$ da $x=\frac{5a}{3}$; $a=0$ da $(-\infty; 0) \cup (0; +\infty)$. **6.525.** $a \in (-\infty; 2) \cup$
 $\cup (2\sqrt{2}; +\infty)$ da \emptyset ; $a \in [2; 2\sqrt{2}]$ da $x=5 \pm \frac{a\sqrt{8-a^2}}{2}$. **6.526.** $a < 0$ da \emptyset ,
 $0 \leq a \leq \frac{1}{2}$ da $x=a+1 \pm \sqrt{2a}$; $a > \frac{1}{2}$ da $x=a+1 + \sqrt{2a}$. **6.527.**
 $x = \frac{\sqrt{2}(1-\sqrt{2\sqrt{3}-3})}{\sqrt{3}-1}$. **6.528.** $[-3; +\infty)$. **6.529.** $(-\infty; +\infty)$. **6.530.** $(-\infty; +\infty)$. **6.531.** \emptyset .
6.532. $(-\infty; +\infty)$. **6.533.** \emptyset . **6.534.** $(-\infty; +\infty)$. **6.535.** $x \neq 0$. **6.536.** \emptyset . **6.537.** \emptyset .
6.538. $(-\infty; 1] \cup [2; +\infty)$. **6.539.** $y \neq -1/2$. **6.540.** $(-\infty; +\infty)$. **6.541.** $(2; 3)$. **6.542.** \emptyset .
6.543. \emptyset . **6.544.** $\{-1\} \cup [2; +\infty)$. **6.545.** $\{-2; 1\} \cup [3; +\infty)$. **6.547.** $(-\infty; -8,5] \cup [1; 10)$.

VII bob

7.1. $x \neq 2$. **7.2.** $x \neq 3,4$. **7.4.** $x \neq -2$. **7.6.** $x \neq 1, x \neq 2, x \neq 3$. **7.7.** $x \neq 3, x \neq 4$. **7.10.**
R. 7.12. $x \neq 2$. **7.13.** $x \neq 3$. **7.14.** **R. 7.16.** $x \neq \pm 1$. **7.18.** $x \neq 0$. **7.19.** $x \neq 0, x \neq 2, x \neq 3$.
7.26. $\left(-\frac{\sqrt{2}}{3}; +\infty\right)$. **7.27.** $\left(-2(2 + (\sqrt{3})); +\infty\right)$. **7.29.** $x \neq -8/7$. **7.32.** $(-\infty; 2]$. **7.33.**
 $\{0\} \cup [1; +\infty)$. **7.34.** $\{0\} \cup [2; +\infty)$. **7.35.** $\{2\}$. **7.40.** $[-0,5; 0,5)$. **7.41.** $[-2; 0] \cup \{1,5\}$. **7.42.**
 $\{1\} \cup [2; 3) \cup (3; +\infty)$. **7.43.** $\{0,5\}$. **7.49.** $(-\infty; 3]$. **7.50.** $(-\infty; 2,25]$. **7.52.** $(-\infty; 0) \cup (0;$
 $+\infty)$. **7.53.** $(-\infty; 1) \cup (1; +\infty)$. **7.54.** $(0; 1]$. **7.55.** $(-\infty; -2] \cup [2; +\infty)$. **7.57.** $[-2; +\infty)$.
7.58. $(-\infty; 5]$. **7.60.** $[2; +\infty)$. **7.61.** $(-\infty; -2]$. **7.62.** $[1; +\infty)$. **7.63.** $[0; 1]$. **7.64.** $[-4; 1)$.
7.65. $[-1; 2)$. **7.66.** $[-2; 1]$. **7.67.** $[-1; 3]$. **7.68.** $[-3; +\infty)$.

[3; 12) ∪ (12; +∞). **7.70.** [6,75; +∞). **7.84.** $\frac{1 \text{ mil. yil}}{1 \text{ h.-qam. yil}} = \frac{365,25}{354,3671} \Rightarrow 1$

h.-q. yil $\approx 0,9702$ m. yil yoki 1 m. yil $\approx 1,0307$ h.-q. yil. M milodiy (yil, oy, kun) dan $H(t)$ hijriy (yil, oy, kun) ga o'tish: $H(t) = 1,0307t$, bunda $t = M - 622$ - yil 16- iyul; H hijriy-qamariy (yil, oy, kun) dan $M(t) = 0,97202 \cdot H(t) + 622$ - yil 16- iyul, bunda 622- yil 16- iyul hijriy hisobning boshi. **7.97.** Ko'rsatma:

$\frac{3x-1}{x+2} = t$ deb oling va $f(t)$ ni toping. **7.102.** $M'(-3; 10)$, $N'(-1; -4)$, $P(0; 1)$,

$Q(2; -1)$. **7.106.** Koordinatalar boshini $L(a; b)$ nuqtaga parallel ko'chirish va $k = 2$ koeffitsiyentli gomotetiyadan foydalaning. **7.119.** a) tenglama $y = ax^2 + bx + c$ ifodadagi noma'lum a , b , c koeffitsiyentlarni topish uchun x va y lar o'rniga A , B , C nuqtalarning koordinatalari qo'yiladi va

$$\begin{cases} -1 = a \cdot 2^2 + b \cdot 2 + c, \\ 3 = a \cdot 1^2 + b \cdot 1 + c, \\ 2 = a \cdot 0^2 + b \cdot 0 + c \end{cases} \text{ sistema tuziladi. Undan } c = 2, a = -2,5, b = -1,5. \text{ Javob:}$$

$y = -2,5x^2 - 1,5x + 2$. **7.120.** 1) $M(x_0; y_0)$ nuqta $y = ax^2$ da yotganligidan $y_0 = ax_0^2$, shu kabi $M'(x_1; y_1)$ nuqta $y = k(x - x_0) + y_0$ kesuvchi to'g'ri chiziqda yotadi. Shunga ko'ra, $y_1 = k(x_1 - x_0) + y_0$ yoki $ax_1^2 = k(x_1 - x_0) + ax_0^2$, bundan $x_1 = \frac{k}{a} - x_0$. Kesuvchi urinmaga aylanganida M va M' nuqtalar

ustma-ust tushadi. Shunga ko'ra, $x_1 = x_0$ va $x_0 = \frac{k}{a} - x_0$ yoki $k = 2ax_0$. **7.134.**

a) juft; b) juft; d) juft; e) juft. **7.135.** d) toq; e) juft. **7.136.** a) juft; b) toq; d) juft; e) juft. **7.137.** a) toq; b) juft; d) juft; e) juft. **7.141.**

$y = \frac{3}{8}x^2 - \frac{9}{4}x + 3$, na toq, na juft. **7.153.** a) $\pm \frac{2\sqrt{3}}{3}$; d) \emptyset ; f) \emptyset ; h) 1. **7.154.**

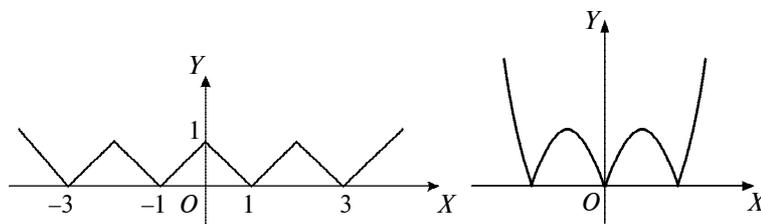
$(-\infty; +\infty)$ da kamayadi. **7.164.** $y_{\max} = 1$, $x_{\max} = 1$. **7.166.** $y_{\max} = \frac{1}{12}$, $x_{\max} = 1,5$.

7.174. $y_{\max} = 0$, $x_{\max} = -2,7$. **7.179.** (80- rasm). **7.182.** (81- rasm). **7.187.** (82-

rasm). **7.204.** Masalan, $y = 1,75x - 51,25$, $y = 1,8x - 54,2$. **7.205.** $y = \frac{2}{7}x$.

7.207. Jadval qiymatlari bo'yicha chizilgan shakl giperbolaga o'xshash.

Tenglamani $I = \frac{a}{R} + b$ ifoda ko'rinishida izlash mumkin. Noma'lum a va b



80- rasm.

81- rasm.



82- rasm.

larni topish uchun jadvaldan ixtiyoriy ikki $(x; y)$ juft qiymat ifodaga qo'yilib, sistema tuziladi va undan a va b lar aniqlanadi. Masalan, $(20; 4,99)$, $(80; 1,25)$

$$\text{lar bo'yicha tuzilgan } \begin{cases} 4,99 = \frac{a}{20} + b, \\ 1,25 = \frac{a}{80} + b \end{cases} \text{ sistemadan } a = 100, b = -0,01 \text{ aniqlanadi.}$$

Natijada $I = \frac{100}{R} - 0,01$ olinadi.

VIII bob

8.4. Manfiy. **8.11.** a) $y = 0,2^x$; b) $(-2)^x$, x – butun toq son. **8.12.** b) 1) $K_d = 1/(1 + 0,1)^1 = 0,9091$, $K_d = 1/(1 + 0,1)^2 = 0,8264$, $K_d = 1/(1 + 0,1)^3 = 0,7513$, $K_d = 1/(1 + 0,1)^4 = 0,6830$; 2) $D_1 = 30000 \cdot 0,9091 = 27273$ so'm, $D_2 = 40000 \times 0,8264 = 33056$ so'm, $D_3 = 50000 \cdot 0,7513 = 37565$ so'm, $D_4 = 60000 \cdot 0,6830 = 40980$ so'm; 3) korxonaning oldingi yillardagi jami daromadi 97794 so'm. Kreditga bu daromad to'lansa ham yana $100000 - 97794 = 2206$ so'm yetmaydi. Uni qoplash uchun 4- yil daromadining $2206/40980 \approx 0,605$ qismi, ya'ni $0,605 \cdot 12 = 7,26$ oy, ya'ni 70 yil 7,8 kunlik daromadini ham beradi va olgan kreditini batamom to'laydi. **8.15.** a) $\frac{1}{3}$; b) $\frac{1}{12}$; d) -7 ; e) $\frac{2}{3}$; f) $-\frac{1}{2}$; g) $-2,5$.

8.16. a) 100; b) 6; d) $\frac{1}{9}$; e) 4. **8.20.** f) 3. **8.29.** $\frac{y_{n+1}}{y_n} = k$, $0 < k \neq 1$ bo'lsin. Ifodani

logarifmlab, $\lg|y_{n+1}| - \lg|y_n| = \lg k$ ni olamiz. Demak, $z = \lg|y|$ funksiyaning chekli ayirmalari doimiy: $\Delta z = c$. Funksiyani $z = \alpha x + \beta$ yoki $\lg|y| = \alpha x + \beta$ ko'rinishda berish mumkin. Bundan $y = 10^{\alpha x + \beta}$ yoki $y = A \cdot a^x$, bunda $A = 10\beta$,

$a = 10\alpha$. **8.31.** a) 10; b) 6826; d) $a + b$. **8.32.** a) $x = \frac{(a+b)^2 \sqrt{a}}{(a-b)^3}$;

b) $x = (a-b)a^{\frac{2}{3}}b$. **8.41.** b) 2; k) $x = 1$; l) $x = \log_{15} 5$; m) $x = 2$; o) $x = \pm 1$;

p) $x = 0$, $x = 2$; q) $x = 0$, $x = \pm 1$; r) $x = \frac{\lg 3}{\lg 2}$; s) $x = 0$, $x = \log_{2,5} 1,5$; t) $x = \pm 2$;

u) $x = 3$. Ko'rsatma: v, x, y, z , o' tenglamalarni yechishda funksiyalarning monotonlik xossalariidan foydalaning. **8.42.** g) $(-\infty; -3) \cup (-1; +\infty)$; h) $[1; +\infty)$; i) $[-\log_3 2; 0]$; j) $[2; +\infty)$; k) $(-\infty; 0] \cup [2; +\infty)$; l) $(-\infty; +\infty)$; m) $(x \in R)$; n) $\{1, 2,$

3, 4, 5, 6, 7}; o) $(-\infty; \log_{0,4}2)$; p) $(-2; +\infty)$; q) $[-1; 0] \cup [2; 3]$; r) $(-\infty; 1) \cup (0; 2)$; s) $(-\infty; \log_2(\sqrt{2}-1) \cup [\frac{1}{2}; +\infty))$; t) $(\frac{5}{3}; 2)$; u) (1; 4). **8.44.**

a) $\frac{25 \pm \sqrt{7}}{8}$; l) $x = 2$; m) $x = 4$; n) $x = 2$; o) $x = 0$; p) $x = 100$;
q) $x = -2 - \sqrt{10}$; r) $x = 3^{-\sqrt{2}}, x = 3^{\sqrt{2}}$; s) $x = \sqrt{5}, x = 5$; t) $x = -1, x = 0$;
u) $x = -\frac{9}{5}, x = 23$; v) $x = 10$. Ko'rsatma: x, y, z, o', g' tenglamalarni yechishda funksiyalarning monotonlik xossalaridan foydalaning. **8.45.** f) $x > 1000$; l) $(\frac{1}{5}; \frac{2}{5})$; m) $(\frac{1}{3}; 2)$; n) $(0; \frac{1}{2}] \cup (2; 4]$; o) $(-\frac{4}{3}; -\frac{17}{22})$; p) (2; 2,5); q) $(\log_3 10; +\infty)$; r) $(0; \frac{1}{2}) \cup (1; 2) \cup (3; 6)$; s) $(-2; -1) \cup (-1; 0) \cup (0; 1) \cup (2; +\infty)$; t) $(-1; -\frac{2}{\sqrt{5}}) \cup (\frac{2}{\sqrt{5}}; 1)$; u) $(0; \frac{1}{2}) \cup (\sqrt{2}; +\infty)$. **8.46.** (2; 4). **8.47.** (2; 1). **8.48.** (8; 2). **8.49.** (1; 1). **8.50.** (4; 1). **8.51.** (2; 4). **8.52.** (4; 3). **8.53.** (2; 8). **8.54.** (1; 1), (9; 27). **8.55.** (1; 1); $(\frac{1}{4}; \frac{1}{2})$. **8.56.** a) (1; 2); b) (0; 3); d) (2; 1000), (2; 0,001); e) (ko'rsatma: sistemani $\begin{cases} |\lg x| + |\lg y| = 1 + \lg 4, \\ \lg y \cdot \lg x = \lg 4 \end{cases}$ ko'rinishga keltiring.) (10; 4), (4; 10), (-10; -4), (-4; -10). **8.79.** 9. **8.80.** -3; 5. Ko'rsatma: $33 + \sqrt{128} = (\sqrt{32} + 1)^2$. **8.81.** 5. **8.82.** 0. **8.83.** $\pm 2; -1$. **8.84.** 1. **8.85.** 0,001; 10. **8.86.** -2. **8.87.** 2. **8.88.** 1. **8.89.** 1. **8.90.** 9. **8.91.** $\log_3 10; \log_3 28 - 3$. **8.92.** 1. **8.93.** 1. **8.94.** 100. **8.95.** $\pm \frac{1}{2}$. **8.96.** $-\frac{13}{5}; -2$; 3. **8.97.** -1. **8.98.** -64; -1. **8.99.** $-\frac{1}{4}$. **8.100.** $\frac{1}{4}$. **8.101.** $-\frac{2}{3}$. **8.102.** 3. **8.103.** $(\frac{1}{2}; +\infty)$. **8.104.** [0; 1]. **8.105.** $(-\infty; -6) \cup (2; +\infty)$. **8.106.** [-2; -1). **8.107.** $(-\frac{3\sqrt{5}+1}{2}; -2) \cup (1; \frac{3\sqrt{5}+1}{2})$. **8.108.** $[\frac{3}{4}; 1)$. **8.109.** $(-\frac{3\sqrt{5}}{5}; -1) \cup (1; \frac{3\sqrt{5}}{5})$. **8.110.** (0; 3). **8.111.** (0; -3). **8.112.** (1; 2). **8.113.** $(\sqrt{2}; \frac{1}{\sqrt{2}})$; (2; 1). **8.114.** (125; 4), (625; 3). **8.115.** $(\frac{1}{4}; \frac{1}{9})$.

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