

TARTU RIIKLIK ÜLIKOOI

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ELEMENTAARMATEMATIKA  
ÜLESANDEID

TARTU 1960

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TEOREETILISE MEHAANIKA KATEEDER

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ELEMENTAARMATEMAATIKA  
ÜLESANDEID

I

Algebralised teisendused ja võrrandid

TARTU 1960

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ЗАДАЧИ ПО ЭЛЕМЕНТАРНОЙ МАТЕМАТИКЕ I  
На эстонском языке

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Tartu Riikliku Ülikooli  
Raamatukogu

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## SISSEJUHATUS.

Käesolev elementaar matemaatika ülesannete kogu on määratud füüsika-matemaatika pedagoogilise haru ja matemaatika osakonna mittestatsionaarsetele üliõpilastele.

Ülesannete kogu koostamisel on kasutatud mitmesuguseid elementaar matemaatika ülesannete kogusid, neist kõige enam:

1. Н.П. Антонов, М.Я. Выгодский, В.В. Никитин, А.И. Санкин, Сборник задач по элементарной математике.
  2. И.С. Барыбин и А.К. Исаков, Сборник задач по математике.
- И.В. Баранова, С.Б. Ляпин, Задачи на доказательство по алгебре.

1. Algebralised teisendused.

Leida juured:

1.  $\sqrt{y^2 (a - 1)}$ .

2.  $\sqrt{(a^2 + 1)(b^2 + 1)^2}$ .

3.  $\sqrt{(b^2 - 1)(b - 1)}$ .

4.  $\sqrt{(2y - 1)^2(y + 4)}$ .

5.  $\sqrt{(y - 6)(y^2 + 6y + 9)}$ .

6.  $\sqrt{(b^2 + 4)^2 y}$ .

7.  $\sqrt{x^2(a^2 - 1)}$ , kui  $x < 0$ .

8.  $\sqrt{x^2 y + x^2 y^2 + x^2}$ .

9.  $\sqrt{(x - 1)(x - 1 - x^2)^2}$ .

Viia tegurid juurimismärgi alla:

10.  $(1 - m)\sqrt{m - 2}$ .

11.  $|3 - x|\sqrt{\frac{x + 3}{x - 3}}$

12.  $(x^2 - x + 4) \sqrt{x-1}$ .

13.  $(3 - m) \sqrt{m-7}$ .

14.  $|5 - x^2| \sqrt{\frac{3}{x^2 - 5}}$ .

Kaotada irratsionaalsus nimetajast:

15.  $\frac{1 + 2\sqrt{35}}{\sqrt{5} + \sqrt{7} + \sqrt{11}}$ .

16.  $\frac{1}{2 + \sqrt{5} + 2\sqrt{2} + \sqrt{10}}$ .

17.  $\frac{\sqrt{2\sqrt{3} + \sqrt{2}}}{\sqrt{2\sqrt{3} - \sqrt{2}}}$ .

18.  $\frac{2 - \sqrt{6}}{2\sqrt{2} + 2\sqrt{3} - \sqrt{6} - 2}$ .

19.  $\frac{1}{\sqrt[3]{9} - \sqrt[3]{6} + \sqrt[3]{4}}$ .

20.  $\frac{1}{\sqrt{10} - \sqrt{15} + \sqrt{14} - \sqrt{21}}$ .

Lihtsustada avaldised:

21.  $\frac{x}{x^2 + y^2} - \frac{y(x-y)^2}{x^4 - y^4}$ .

$$22. \frac{1}{a(a-b)(a-c)} + \frac{1}{b(b-a)(b-c)} + \frac{1}{c(c-a)(c-b)} .$$

$$23. \frac{a^2 - 1}{n^2 + an} \cdot \left( \frac{1}{1 - \frac{1}{n}} - 1 \right) \cdot \frac{a - an^3 - n^4 + n}{1 - a^2} .$$

$$24. \frac{x}{ax - 2a^2} - \frac{2}{x^2 + x - 2ax - 2a} \cdot \left( 1 + \frac{3x + x^2}{3 + x} \right) .$$

$$25. \left( \frac{x - y}{2y - x} - \frac{x^2 + y^2 + y - 2}{x^2 - xy - 2y^2} \right) : \frac{4x^4 + 4x^2y + y^2 - 4}{x^2 + y + xy + x} .$$

$$26. \frac{1}{2} \left( \sqrt{x^2 + a} + \frac{x^2}{\sqrt{x^2 + a^2}} \right) + \frac{a}{2} \cdot \frac{1 + \frac{x}{\sqrt{x^2 + a^2}}}{x + \sqrt{x^2 + a}} .$$

$$27. \sqrt{\frac{x}{x - a^2}} : \left( \frac{\sqrt{x} - \sqrt{x - a^2}}{\sqrt{x} + \sqrt{x - a^2}} - \frac{\sqrt{x} + \sqrt{x - a^2}}{\sqrt{x} - \sqrt{x - a^2}} \right) .$$

$$28. \sqrt[6]{8x(7 + 4\sqrt{3})} \cdot \sqrt[3]{2\sqrt{6x} - 4\sqrt{2x}} .$$

$$29. \frac{b}{a - b} \sqrt[3]{(a^2 - 2ab + b^2)(a^2 - b^2)(a + b)} \cdot \frac{a^3 - b^3}{\sqrt{(a + b)^2}} .$$

$$30. \frac{x + \sqrt{x^2 - 4x}}{x - \sqrt{x^2 - 4x}} - \frac{x - \sqrt{x^2 - 4x}}{x + \sqrt{x^2 - 4x}} .$$

$$31. \frac{\sqrt{\frac{1+a}{1-a}} + \sqrt{\frac{1-a}{1+a}}}{\sqrt{\frac{1+a}{1-a}} - \sqrt{\frac{1-a}{1+a}}} - \frac{1}{a} .$$

$$32. \frac{2}{3} \left[ \frac{1}{1 + \left( \frac{2x+1}{\sqrt{3}} \right)^2} + \frac{1}{1 + \left( \frac{2x-1}{\sqrt{3}} \right)^2} \right] .$$

$$33. \frac{n+2+\sqrt{n^2-4}}{n+2-\sqrt{n^2-4}} + \frac{n+2-\sqrt{n^2-4}}{n+2+\sqrt{n^2-4}}.$$

$$34. \sqrt{b} \sqrt{\sqrt{a+b}-\sqrt{a}} \cdot \sqrt{\sqrt{a}+\sqrt{a+b}}.$$

$$35. \left(1 + \sqrt{1-x^2} + \frac{x^2}{\sqrt{1-x^2}}\right) : \left(\frac{1}{1-x^2} + \frac{1}{\sqrt{1-x^2}}\right),$$

kuf  $|x| > 1$ .

$$36. \frac{1}{\sqrt{1 - \left(\frac{x-1}{x}\right)^2}} \cdot \frac{x^2 - \sqrt{x^4 + 2x^2 + 1}}{x}, \text{ kuf } x > \frac{1}{2}.$$

$$37. \left[\sqrt{a(1-a)} + \frac{\sqrt{a^3}}{\sqrt{1-a}}\right] : \left[\frac{1}{1+\sqrt{a}} + \frac{\sqrt{a}}{1-a}\right],$$

kuf  $0 < a < 1$ .

$$38. \sqrt{\frac{2+\sqrt{3}}{\sqrt{3}-1} - \frac{2+2\sqrt{3}}{3-\sqrt{3}}} \cdot \sqrt{\sqrt{3}-1}.$$

$$39. \frac{\sqrt{3-2\sqrt{2}}}{\sqrt{17-12\sqrt{2}}} - \frac{\sqrt{3+2\sqrt{2}}}{\sqrt{17+12\sqrt{2}}}.$$

$$40. \frac{27 + 3\sqrt{2} - (9 + \sqrt{2})^4 \sqrt{2}}{9 - 3\sqrt[4]{2}}.$$

$$41. \left[ \sqrt[3]{(n^2+1)\sqrt{1+\frac{1}{n^2}}} + \sqrt{(n^2-1)\sqrt{1-\frac{1}{n^2}}} \right]^{-2},$$

kuf  $n > 1$ .

$$42. (1+x^{-1})^{-2} + (1-x^{-1})^{-2}, \text{ kuf } x = (1-n^{-1})^{\frac{1}{2}} \cdot (1+n^{-1})^{-\frac{1}{2}},$$

kuf  $n > 1$ .

43.  $(x^{-1} + a^{-1})(x + a)^{\frac{1}{n}} - b^{-1}x^{\frac{1}{n}}$ , kui

$$x = ab^{\frac{n}{n+1}} \left( a^{\frac{n}{n+1}} - b^{\frac{n}{n+1}} \right)^{-1}.$$

44.  $\left[ \frac{(1-x^2)^{-\frac{1}{2}} + 1}{2} \right]^{-\frac{1}{2}} + \left[ \frac{(1-x^2)^{-\frac{1}{2}} - 1}{2} \right]^{-\frac{1}{2}},$

kui  $x = \frac{2k^{\frac{1}{2}}}{1+k}, k > 1.$

45.  $\frac{\sqrt{m+x} + \sqrt{m-x}}{\sqrt{m+x} - \sqrt{m-x}},$  kui  $x = \frac{2mn}{1+n^2}.$

46.  $\frac{\sqrt{a-2\sqrt{a+1}}}{\sqrt{a}-2\sqrt[4]{a+1}} : \frac{\sqrt[4]{a+1}+1}{\sqrt[4]{a}-1} + 1.$

47.  $\left[ \frac{1-a^2}{\left( \frac{1-a\sqrt{a}}{1-\sqrt{a}} + \sqrt{a} \right) \left( \frac{1+a\sqrt{a}}{1+\sqrt{a}} - \sqrt{a} \right)} + 1 \right] \cdot \sqrt{(1-a)^2},$

kui  $a \neq 1,$   
 $a > 0.$

48.  $\sqrt{x+2\sqrt{x-1}} + \sqrt{x-2\sqrt{x-1}},$  kui  $x \geq 1.$

49.  $\left( \frac{1}{\sqrt{x-1}} + \frac{1}{\sqrt{x+1}} \right) : \left( \frac{1}{\sqrt{x-1}} - \frac{1}{\sqrt{x+1}} \right),$

kui  $x = \frac{a^2 + b^2}{2ab}.$

50.  $(a + x^{\frac{1}{2}})^{-\frac{1}{2}} + (a - x^{\frac{1}{2}})^{-\frac{1}{2}},$  kui  $x = 4(a-1), a > 1.$

51.  $\sqrt{x - \sqrt{2x-1}},$  kui  $x \geq \frac{1}{2}.$

$$52. \sqrt{a^2 + a\sqrt{8} + 2} + \sqrt{a^2 - a\sqrt{8} + 2}.$$

Tõestada samasused:

$$53. a^{\frac{1}{2}} - \frac{a - a^{-2}}{a^{\frac{1}{2}} - a^{-\frac{1}{2}}} + \frac{1 - a^{-2}}{a^{\frac{1}{2}} + a^{-\frac{1}{2}}} + \frac{2}{a^{\frac{1}{2}}} = 0.$$

$$54. \sqrt{\frac{R(2R+a)}{2}} - \sqrt{\frac{R(2R-a)}{2}} = \sqrt{R(2R - \sqrt{4R^2 - a^2})}$$

$$55. 6\sqrt{2} \frac{2a + \sqrt{a^2 - b^2}}{\sqrt{a + \sqrt{a^2 - b^2}}} = \sqrt{(a+b)^3} - \sqrt{(a-b)^3},$$

kui  $a > b > 0$ .

$$56. \sqrt{8 + 2\sqrt{10} + 2\sqrt{5}} + \sqrt{8 - 2\sqrt{10} + 2\sqrt{5}} = \sqrt{2}(\sqrt{5} + 1).$$

$$57. \frac{\sqrt{3} - 1}{\sqrt{3} + 1} = \sqrt[3]{\frac{9 - 5\sqrt{3}}{9 + 5\sqrt{3}}}.$$

$$58. \sqrt[3]{20 + 14\sqrt{2}} + \sqrt[3]{20 - 14\sqrt{2}} = 4.$$

$$59. \sqrt[3]{6 + \sqrt{\frac{847}{27}}} + \sqrt[3]{6 - \sqrt{\frac{847}{27}}} = 3.$$

$$60. \frac{1}{\sqrt{6} - \sqrt{5}} = \frac{3}{\sqrt{5} - \sqrt{2}} + \frac{4}{\sqrt{6} + \sqrt{2}}.$$

$$61. \left(\frac{11}{5 - \sqrt{3}}\right)^2 - \left(\frac{5 - 2\sqrt{5}}{2 - \sqrt{5}}\right)^2 = \sqrt{\frac{91}{4} + 10\sqrt{3}}.$$

$$62. \frac{2\sqrt{9 + \sqrt{65}}}{\sqrt{19} - \sqrt{3}} = \frac{\sqrt{19} + \sqrt{3}}{2\sqrt{9 - \sqrt{65}}}.$$

$$63. \frac{2 + \sqrt{3}}{\sqrt{2} + \sqrt{2 + \sqrt{3}}} + \frac{2 - \sqrt{3}}{\sqrt{2} - \sqrt{2 - \sqrt{3}}} = \sqrt{2}.$$

$$64. \sqrt{8 - 4\sqrt{2 + \frac{\sqrt{5} - 1}{2}}} = \sqrt{5} - 1.$$

## 2. Algebralised võrrandid.

Kas järgnevad võrrandid on samaväärsed?

$$65. x + 3 = 2x - 5 \quad \text{ja} \quad (x^2 - 1)(x + 3) = (2x - 5)(x^2 + 1).$$

$$66. x - 1 = 0 \quad \text{ja} \quad (x - 1)(x^2 - 3) = 0.$$

$$67. x^2 - 1 = 0 \quad \text{ja} \quad (x - 1)(x^2 - 2) = 0.$$

$$68. x - 7 = 2 \quad \text{ja} \quad x^2 - 7x = 2x.$$

$$69. 3x - 1 = 5x + 2 \quad \text{ja} \quad (x - 2)(3x - 1) = (5x + 2)(x - 2).$$

$$70. x^2 - 6x + 9 = 0 \quad \text{ja} \quad \frac{2}{x^2 - 4} - \frac{1}{x(x - 2)} = \frac{4}{x(x + 2)}.$$

71. Koostada ruutvõrrand, mille lahendeiks on:

$$a) \frac{1}{10 - \sqrt{72}} \quad \text{ja} \quad \frac{1}{10 + 6\sqrt{2}};$$

$$b) \frac{a}{\sqrt{a} + \sqrt{a - b}} \quad \text{ja} \quad \frac{a}{\sqrt{a} - \sqrt{a - b}}.$$

72. Koostada biruutvõrrand, mille lahendeiks on:

$$a) \pm (\sqrt{5} \pm \sqrt{3}); \quad b) \pm \sqrt{5} \quad \text{ja} \quad \pm i.$$

73. Ruutvõrrandi  $ax^2 + bx + c = 0$  lahendeiks on  $x_1$  ja  $x_2$ .  
Koostada ruutvõrrand, mille lahendeiks on  $\frac{x_1}{x_2}$  ja  $\frac{x_2}{x_1}$ .

74. Antud ruutvõrrandi  $ax^2 + bx + c = 0$  lahendeid kasutades koostada ruutvõrrand, mille lahendid on:

a) kaks korda suuremad;

b) pöördvõrdelised antud võrrandi lahenditega.

75. Näidata, et võrrandi  $x^2 + px + q = 0$  lahendid  $x_1$  ja  $x_2$  rahuldavad seoseid  $x_1^3 + x_2^3 = 3pq - p^3$ ;  $x_1^3 - x_2^3 = \pm(p^2 - q) \sqrt{p^2 - 4q}$ .

76. Näidata, et võrrandi  $ax^2 + bx + c = 0$  lahendid  $x_1$  ja  $x_2$  rahuldavad seoseid

$$x_1^2 + x_2^2 = \frac{b^2 - 2ac}{a^2}; \quad x_1^3 + x_2^3 = \frac{3abc - b^3}{a^3}.$$

77. Näidata, et võrrandi  $ax^2 + nbx + n^2c = 0$  lahendid on  $n$  korda suuremad võrrandi  $ax^2 + bx + c = 0$  lahenditest.

78. Võrrandi  $x^2 + px + 12 = 0$  lahendite vahe on 1. Määrata  $p$ .

79. Leida võrrandi  $ax^2 + bx + c = 0$  vaheline seos, kui lahendite summa on kaks korda suurem nende vahest.

80. Määrata võrrandis  $(k^2 - 5k + 3)x^2 + (3k - 1)x + 2 = 0$   $k$  nii, et lahendite suhe oleks 2.

81. Leida võrrandi  $ax^2 + bx + c = 0$  kordajate vaheline seos, kui lahendite jagatis on 2.

82. Leida võrrandi  $x^2 + px + q = 0$  kordajate vaheline seos, kui lahendite vahe on  $a$ .

83. Näidata, et võrrandi  $x^2 + px + q = 0$  lahendite pöördväärtuste summa on  $-\frac{p}{q}$ .

84. Tõestada, et ruutvõrrandil  $ax^2 + bx + c = 0$  ei saa olla rohkem kui kaks erinevat lahendit.

85. Tõestada, et võrrandil

$$(a^2 + b^2 + c^2)x^2 + 2(a + b + c)x + 3 = 0$$

ei ole reaalseid lahendeid, kui  $a \neq b \neq c$ .

86. Tõestada, et võrrandi  $x^4 + px^2 + q = 0$  lahendite summa on null ja lahendite korrutis  $q$ .

87. Tõestada, et võrrandi  $ax^3 + bx^2 + cx + d = 0$  kordajate ja lahendite vahel kehtivad seosed  $x_1 + x_2 + x_3 = -\frac{b}{a}$ ;  
 $x_1 \cdot x_2 + x_1 \cdot x_3 + x_2 \cdot x_3 = \frac{c}{a}$ ;  $x_1 \cdot x_2 \cdot x_3 = -\frac{d}{a}$ .

Lahendada võrrandid

88.  $x^4 - 34x^2 + 225 = 0$ .

89.  $2x^4 - 3x^2 - 20 = 0$ .

90.  $5x^4 + 2x^2 - 423 = 0$ .

91.  $x^6 - 35x^3 + 216 = 0$ .

92.  $x^6 + 5x^3 - 24 = 0$ .

93.  $x^8 - 15x^4 - 16 = 0$ .

94.  $3(x^2 - 5\frac{1}{3}) + \frac{1}{4}x^4 = 0$ .

95.  $\frac{12(3 - x^2)}{5x^2 + 10\sqrt{2}} = \frac{2\sqrt{2} - x^2}{10}$ .
96.  $(x^2 - x)^2 - 4(x^2 - x) - 12 = 0$ .
97.  $(x^2 + 6x - 27) \cdot (x^2 + 6x + 5) = -135$ .
98.  $(2x^2 + 3x - 1)^2 - 5(2x^2 + 3x + 3) + 24 = 0$ .
99.  $(x^2 - x + 1)^4 - 6x^2(x^2 - x + 1)^2 + 5x^4 = 0$ .
100.  $(x - 1)(x + 2)(x - 3)(x + 4) = 144$ .
101.  $(x + 1)(x + 1\frac{2}{3})(x + 2\frac{1}{3})(x + 3) = \frac{1}{9}$ .
102.  $(x + 3)(x + 4)(x + 5)(x + 6) = 8$ .
103.  $(x + 1)(x + 3)(x - 4)(x - 7) + (x - 1)(x - 3)(x + 4)(x + 7) = 98$
104.  $(x^2 + 4x + 8)^2 + 3x(x^2 + 4x + 8) + 2x^2 = 0$ .
105.  $2(x^2 + 6x + 1)^2 + 5(x^2 + 6x + 1)(x^2 + 1) + 2(x^2 + 1)^2 = 0$ .
106.  $x^4 + 4x^3 - 8x + 3 = 0$ .
107.  $(x + 3)^4 + (x + 5)^4 = 4$ .
108.  $x^4 + 4x^3 + 5x^2 + 2x - 12 = 0$ .
109.  $x^2(1 + x)^2 + x^2 = 8(1 + x)^2$ .
110.  $x^3 + \frac{1}{x^3} = 6(x + \frac{1}{x})$ .
111.  $x^4 + 6x^3 + 9x^2 - 100 = 0$ .
112.  $\frac{2^a}{x - 2^a} : \frac{2}{x - 2^a} = \frac{x}{2}$ .
113.  $\frac{x - 1}{-x} = \frac{x^2 - 1}{x} - x$ .
114.  $\frac{x + 3}{x - 2} + \frac{x - 2}{x + 3} = \frac{10}{3}$ .

$$115. \frac{x^4 + 4}{x^2 - 1} = \frac{5x^2}{x^2 - 1}.$$

$$116. \frac{x}{3x^2 - 3} - \frac{1}{x^3 + x} + \frac{2x^2}{3x - 3x^5} = 0.$$

$$117. \frac{x+1}{2x-2} - \frac{x^2+3}{2x^2-2} + \frac{2x-3}{x+1} = 0.$$

$$118. \frac{1}{x^2 - 2x + 2} + \frac{2}{x^2 - 2x + 3} = \frac{6}{x^2 - 2x + 4}.$$

$$119. \frac{1}{x^2 + 2x - 3} + \frac{18}{x^2 + 2x + 2} - \frac{18}{x^2 + 2x + 1} = 0.$$

$$120. x^2 + \frac{9x^2}{(3+x)^2} = 7.$$

$$121. \frac{a^2}{ax + x^2} - \frac{a^2 - x^2}{ax} - \frac{x^2}{a^2 + ax} = 0.$$

$$122. \frac{1}{n-x} - \frac{3nx}{n^3 - x^3} - \frac{x-n}{n^2 + nx + x^2} = 0.$$

$$123. 5x^3 - 21x^2 - 21x + 5 = 0.$$

$$124. 25x^4 - 100x^3 - 106x^2 - 100x + 25 = 0.$$

$$125. 6x^4 - 35x^3 + 62x^2 - 35x + 6 = 0.$$

$$126. 2\sqrt{5}x^4 - 9x^3 + 4,8\sqrt{5}x^2 - 9x + 2\sqrt{5} = 0.$$

$$127. 2x^4 + 2\frac{1}{21}x^3 - 84x^2 - 2\frac{1}{21}x + 2 = 0.$$

$$128. x^5 - 4x^4 + 3x^3 + 3x^2 - 4x + 1 = 0.$$

$$129. 2x^5 + x^4 + 4x^3 + 4x^2 + x + 2 = 0.$$

$$130. 2x^5 + x^4 + x + 2 = 0.$$

$$131. 2|x+1| = x+4.$$

$$132. x - \frac{|3x-2|}{5} = 3 - \frac{2x-5}{3}.$$

$$133. \quad |x^2 - 6| - 4x = x^2.$$

$$134. \quad |3x^2 - 12x + 1| = x^2 - 4x + 11.$$

$$135. \quad x^2 - |2x^2 - 5x| = 12.$$

$$136. \quad 3x - 6 + 4|x + 1| + 5|x - 2| = 0.$$

$$137. \quad |x - 1| + |x - 2| = 1.$$

$$138. \quad |x + 4| - |x^2 - 4x| + x^2 - x = 4.$$

$$139. \quad |4x^2 - 6| + |3x^2 - 4| = x^2 + 2x + 10.$$

$$140. \quad |3x^2 - 5| + |2x^2 - 3| = x^2 + 2x + 4.$$

$$141. \quad |x^2 - 5| + |2x^2 + 3x| = x^2 + 2x + 5.$$

$$142. \quad |1 - x| - |x - 2| - |x - 3| = 0.$$

$$143. \quad |x - 4| - |x - 2| - |x + 1| = 3.$$

$$144. \quad |x - 2| + |x - 3| + |2x - 8| = 9.$$

$$145. \quad |x - 3| - 2|x + 1| + 2|x| - x + 1 = 0.$$

$$146. \quad \frac{a + x}{a^2 + ax + x^2} - \frac{a - x}{ax - x^2 - a^2} = \frac{3a}{x(a^4 + a^2x^2 + x^4)}.$$

$$147. \quad \frac{x - 1}{n - 1} + \frac{2n^2(1 - x)}{n^4 - 1} = \frac{2x - 1}{1 - n^4} - \frac{1 - x}{1 + n}.$$

$$148. \quad \frac{x + x^2}{1 - x^2} : \frac{1 - a^2}{(1 + ax)^2 - (a + x)^2} = \frac{ab}{(b - a)^2}.$$

$$149. \quad \frac{2x}{x + b} - \frac{x}{b - x} = \frac{b^2}{4(x^2 - b^2)}.$$

$$150. \quad 1 - \frac{2a}{x - a} = \frac{b^2 - a^2}{a^2 + x^2 - 2ax}.$$

$$151. \quad \frac{x^3}{a - b} - \frac{4a^2b^2}{ax - bx} = 2(a + b)x, \quad a \neq b.$$

$$152. \frac{an}{a-x} + \frac{(a+n)(anx + nx^2 + x^3)}{x^3 + nx^2 - a^2x - a^2n} = \frac{ax}{n+x} + \frac{nx^2}{x^2 - a^2}.$$

$$153. \frac{a^2 + x}{b^2 - x} - \frac{a^2 - x}{b^2 + x} = \frac{4abx + 2a^2 - 2b^2}{b^4 - x^2}.$$

$$154. \frac{a - x^2}{(a - x)^2} - \frac{1}{a} = \frac{a - 1}{a^3 - ax(2a - x)}.$$

$$155. \frac{x - a - b}{c} + \frac{x - b - c}{a} + \frac{x - c - a}{b} = 3.$$

$$156. \frac{(2m - ax)^3 + (ax - 3n)^3}{(2m - ax)^2 + (ax - 3n)^2} = 2m - 3n.$$

$$157. \frac{a + x - 2n}{2a - n} - \frac{a - 2n}{x} = 1.$$

$$158. \frac{6b + 7a}{6b} - \frac{3ay}{2b^2} = 1 - \frac{ay}{b^2 - ab}.$$

$$159. \frac{ay - b}{a + b} + \frac{by + a}{a - b} = \frac{a^2 + b^2}{a^2 - b^2}.$$

$$160. \left( \frac{a+1}{ax+1} + \frac{x+1}{x+a-1} - 1 \right) : \left[ \frac{a+1}{(x+a-1)a} - \frac{a(x+1)}{ax+1} + 1 \right] = \frac{x}{2}.$$

$$161. \frac{m}{z} + \frac{z}{m} + \frac{m(z-m)}{z(z+m)} - \frac{z(z+m)}{m(z-m)} = \frac{mz}{m^2 - z^2} - 2.$$

$$162. (x^2 + 2m)^2 - 2(x^2 + 2m)(x^2 - 3m) - 3(x^2 - 3m)^2 = 0.$$

$$163. \frac{4 - 4(n^2 + x^2) - x^4}{8(1-n)} = 1, \text{ kus } n \text{ on reaalarv.}$$

$$164. \frac{a^4 + x^4}{4a^2} - \frac{a^2x^2 + 8a - 2}{2a^2} = 2a - 5, \text{ kus } a \text{ on reaalarv.}$$

$$165. a^2 + x^4 = 2a(n^2 + x^2) - n^2(n^2 - 2x^2).$$

$$166. a(\sqrt{x} - a) - b(\sqrt{x} - b) + a + b = \sqrt{x}.$$

$$167. \begin{cases} 3x + 2y = -5 \\ 41x + 17y = -89 \end{cases}$$

$$168. \begin{cases} 2x - 8y + 10z = -5 \\ 4x + 5y - 20z = 3 \\ 6x - 2y - 5z = 0 \end{cases}$$

$$169. \begin{cases} a^3 + a^2x + ay + z = 0 \\ b^3 + b^2x + by + z = 0 \\ c^3 + c^2x + cy + z = 0 \end{cases}$$

$$170. \begin{cases} x + y + z = 1 \\ ax + by + cz = d \\ a^2x + b^2y + c^2z = d^2 \end{cases}$$

$$171. \begin{cases} (b + c)(y + z) - ax = b - c \\ (c + a)(z + x) - by = c - a \\ (a + b)(x + y) - cz = a - b \end{cases}$$

$$172. \begin{cases} x + y + z = 6 \\ x - 2y - 3z = -12 \\ 7x + 3y - 13z = -26 \end{cases}$$

$$173. \begin{cases} x^2 - y = 23 \\ x^2y = 50 \end{cases}$$

$$174. \begin{cases} x + y = 5 \\ xy = 6 \end{cases}$$

$$175. \begin{cases} x + xy + y = 11 \\ x^2y + xy^2 = 30 \end{cases}$$

$$176. \begin{cases} x + y^2 = 7 \\ xy^2 = 12 \end{cases}$$

$$177. \quad \begin{cases} \frac{x}{y} + \frac{y}{x} = \frac{25}{12} \\ x^2 - y^2 = 7 \end{cases}$$

$$178. \quad \begin{cases} \frac{x}{y} - \frac{y}{x} = \frac{3}{2} \\ x^2 + y^2 = 45 \end{cases}$$

$$179. \quad \begin{cases} x^2 + xy = 6 \\ y^2 + xy = 3 \end{cases}$$

$$180. \quad \begin{cases} x^2 + 2y^2 = 17 \\ 6x^2 - xy - 12y^2 = 0 \end{cases}$$

$$181. \quad \begin{cases} x^2 - xy + y^2 = 21 \\ 2xy - y^2 = 15 \end{cases}$$

$$182. \quad \begin{cases} 5x^2 - 6xy + 5y^2 = 29 \\ 7x^2 - 8xy + 7y^2 = 43 \end{cases}$$

$$183. \quad \begin{cases} x^2 - 2xy - y^2 = 2 \\ xy + y^2 = 4 \end{cases}$$

$$184. \quad \begin{cases} xy = 2 \\ yz = 6 \\ xz = 3 \end{cases}$$

$$185. \quad \begin{cases} xy = 2 \\ xz = 3 \\ x^2 + y^2 = 5 \end{cases}$$

$$186. \quad \begin{cases} y - x = 3 \\ y - z = 4 \\ x^2 + y^2 + z^2 = 30 \end{cases}$$

$$187. \quad \begin{cases} xy + x + y = 34 \\ x^2 + y^2 - (x + y) = 42 \end{cases}$$

$$188. \quad \begin{cases} x^3 + y^3 = 91 \\ x + y = 7 \end{cases}$$

$$189. \quad \begin{cases} x^2 - y^2 = 5 \\ x + y = 5 \end{cases}$$

$$190. \quad \begin{cases} x^2 + y^2 = 2(xy + 2) \\ x + y = 6 \end{cases}$$

$$191. \quad \begin{cases} x^2 - xy + y^2 = 7 \\ x - y = 1 \end{cases}$$

$$192. \quad \begin{cases} x + y + x^2 + y^2 = 8 \\ xy + x^2 + y^2 = 7 \end{cases}$$

$$193. \quad \begin{cases} x^2 - y^2 + x - y = 14 \\ (x^2 - y^2)(x - y) = 24 \end{cases}$$

$$194. \quad \begin{cases} x^3 + y^3 = 186 - 2xy(x + y) \\ x + y = 6 \end{cases}$$

$$195. \quad \begin{cases} y^2(x^2 - 3) + yx + 1 = 0 \\ y^2(3x^2 - 6) + yx + 2 = 0 \end{cases}$$

$$196. \quad \begin{cases} x^2(4 - 3y^2) - 2xy + 1 = 0 \\ x^2(2y^2 - 2) - xy + 1 = 0 \end{cases}$$

$$197. \quad \begin{cases} 2x^2y^2 - 4y^2 - xy + 2 = 0 \\ 3x^2y^2 - 8y^2 + 3xy - 2 = 0 \end{cases}$$

$$198. \quad \begin{cases} (x + y + 1)^2 + (x + y)^2 = 25 \\ x^2 - y^2 = 3 \end{cases}$$

$$199. \quad \begin{cases} (x^2 + y^2)(x - y) = 447 \\ xy(x - y) = 210 \end{cases}$$

$$200. \quad \begin{cases} x + y = 4 \\ x^4 + y^4 = 44\frac{1}{8} \end{cases}$$

$$201. \quad \begin{cases} x^3 + y^3 = 1 \\ x^2y + 2xy^2 + y^3 = 2 \end{cases}$$

$$202. \quad \begin{cases} (x^2 - y^2)xy = 180 \\ x^2 - xy - y^2 = -11 \end{cases}$$

$$203. \quad \begin{cases} x(y + z) = 5 \\ y(z + x) = 8 \\ z(x + y) = 9 \end{cases}$$

$$204. \quad \begin{cases} x + y + z = 9 \\ \frac{1}{x} + \frac{1}{y} + \frac{1}{z} = 1 \\ xy + xz + yz = 27 \end{cases}$$

$$205. \quad \begin{cases} \frac{xy}{ay + bx} = c \\ \frac{zx}{az + cx} = b \\ \frac{yz}{bz + cy} = a \end{cases}$$

$$206. \quad \begin{cases} x^2 + y^2 = 3xyz \\ y^2 + z^2 = 4xyz \\ z^2 + x^2 = 5xyz \end{cases}$$

$$207. \quad \begin{cases} x^2 + y^2 = z^2 \\ xy + zy + zx = 47 \\ (z - x)(z - y) = 2 \end{cases}$$

$$208. \quad \begin{cases} x^2 + y^2 = z^2 \\ xz = y^2 \\ xy = a^2 \end{cases}$$

$$209. \quad \begin{cases} x + y = 5z \\ x^2 + y^2 = 13z \\ x^3 + y^3 = 35z \end{cases}$$

$$210. \quad \begin{cases} (x + y)(x + y + z) = 72 \\ (y + z)(x + y + z) = 120 \\ (z + x)(x + y + z) = 96 \end{cases}$$

$$211. \quad \sqrt{x - 5} = -8$$

212.  $\sqrt{x+2} - \sqrt{x-6} = 2.$

213.  $\sqrt{2x-9} + \sqrt{3-x} = 5.$

214.  $\sqrt{x+3} + \sqrt{3x-2} = 7.$

215.  $\sqrt{x+1} + \sqrt{2x+3} = 1.$

216.  $\sqrt{7x} - \sqrt{2x-5} = 4.$

217.  $\sqrt{2x-3} + \sqrt{1-x} = 3.$

218.  $\sqrt{x+1} + \sqrt{2-3x} + 1 = 0.$

219.  $\sqrt{x^2-4x} + \sqrt{x-x^2} - \sqrt{x} = 0.$

220.  $\sqrt{3x^2+5x+8} - \sqrt{3x^2+5x+1} = 1.$

221.  $x^2 + 3 - \sqrt{2x^2 - 3x + 2} = \frac{3}{2}(x + 1).$

222.  $\sqrt{1+x\sqrt{x^2+24}} = x + 1.$

223.  $\sqrt{x + \sqrt{6x-9}} + \sqrt{x - \sqrt{6x-9}} = \sqrt{6}.$

224.  $\sqrt{37-5x-8\sqrt{21-5x}} + \sqrt{5(x+9)-14\sqrt{5x-4}} = 6.$

225.  $\sqrt{x} + \sqrt{x + \sqrt{1-x}} = 1.$

226.  $\sqrt{2\sqrt{7} + \sqrt{x}} - \sqrt{2\sqrt{7} - \sqrt{x}} = \sqrt[4]{28}.$

227.  $\sqrt{y-2} + \sqrt{2y-5} + \sqrt{y+2} + 3\sqrt{2y-5} = 7\sqrt{2}.$

228.  $\sqrt{23 + \sqrt{2x - \sqrt{5x^2 - 21x + 22}}} = 5.$

229.  $\sqrt[5]{(7x-3)^3} + 8\sqrt[5]{(3-7x)^{-3}} = 7.$

$$230. (a+x)^{\frac{2}{3}} + 4(a-x)^{\frac{2}{3}} - 5(a^2-x^2)^{\frac{1}{3}} = 0.$$

$$231. \sqrt[3]{a+\sqrt{x}} + \sqrt[3]{a-\sqrt{x}} = \sqrt[3]{b}.$$

$$232. \sqrt{x} = \sqrt{a-x} + \sqrt{b-x}, \text{ kui } a > b > 0.$$

$$233. x = a - \sqrt{a^2 - x} \sqrt{x^2 + a^2}.$$

$$234. \frac{\sqrt{x+1} - \sqrt{x-1}}{\sqrt{x+1} + \sqrt{x-1}} = 2 - x.$$

$$235. \sqrt{x+\sqrt{x}} - \sqrt{x-\sqrt{x}} = \frac{3}{2} \sqrt{\frac{x}{x+\sqrt{x}}}.$$

$$236. \frac{\sqrt[5]{3+x}}{3} + \frac{\sqrt[5]{3+x}}{x} = \frac{64}{3} \sqrt[5]{x}.$$

$$237. \frac{3+x}{x} = \sqrt{\frac{1}{9} + \frac{1}{x} \sqrt{\frac{4}{9} + \frac{2}{x}}}.$$

$$238. \frac{2-\sqrt{x}}{2-x} = \sqrt{\frac{2}{2-x}}.$$

$$239. \frac{21}{\sqrt{2x+1}} - 2\sqrt{x} = \sqrt{2x+1}.$$

$$240. \frac{\sqrt{27+x} + \sqrt{27-x}}{\sqrt{27+x} - \sqrt{27-x}} = \frac{27}{x}.$$

$$241. \frac{(x-1)(x-2) - (x-3)(x-4)}{\sqrt{x^2-3x+2} - \sqrt{x^2-7x+12}} = \sqrt{2}.$$

$$242. \sqrt{\frac{x-5}{x+2}} + \sqrt{\frac{x-4}{x+3}} = \frac{7}{x+2} \sqrt{\frac{x+2}{x+3}}.$$

$$243. \frac{\sqrt{x^2-16}}{7\sqrt{x-3}} + \frac{\sqrt{x+3}}{7} = \frac{1}{\sqrt{x-3}}.$$

$$244. \frac{4}{x+\sqrt{x^2+x}} - \frac{1}{x-\sqrt{x^2+x}} = \frac{3}{x}.$$

$$245. \frac{2}{2 + \sqrt{4 - x^2}} - \frac{1}{2 - \sqrt{4 - x^2}} = \frac{1}{x}.$$

$$246. \sqrt{1 + \frac{9}{x}} + \sqrt{\frac{x}{x+9}} = 2,05.$$

$$247. \left(1 + \frac{9}{x}\right)^{\frac{1}{2}} + 4\left(\frac{x}{x+9}\right)^{\frac{1}{2}} = 4.$$

$$248. \begin{cases} \sqrt{x+y} + \sqrt{2x+4y} = \sqrt{2} + 4 \\ \sqrt{x+2y} - \sqrt{2x+2y} = 2\sqrt{2} - 2. \end{cases}$$

$$249. \begin{cases} \sqrt{\frac{x}{y}} + \sqrt{\frac{y}{x}} = \frac{5}{2} \\ x + y = 10. \end{cases}$$

$$250. \begin{cases} \sqrt{\frac{x}{y}} - \sqrt{\frac{y}{x}} = \frac{3}{2} \\ x + y + xy = 9. \end{cases}$$

$$251. \begin{cases} \frac{12}{\sqrt{x-1}} + \frac{5}{\sqrt{y+0,25}} = 5 \\ \frac{8}{\sqrt{x+1}} + \frac{10}{\sqrt{y+0,25}} = 6. \end{cases}$$

$$252. \begin{cases} \frac{2}{\sqrt{x+y}} + \frac{2}{\sqrt{3+7y-y^2}} = 1 \\ \frac{16}{\sqrt{x+y}} - \frac{10}{\sqrt{61-(2y-7)^2}} = 1. \end{cases}$$

$$253. \begin{cases} \sqrt{\frac{x}{y}} + \sqrt{\frac{y}{x}} = \frac{7}{\sqrt{xy}} + 1 \\ \sqrt{x^3y} + \sqrt{y^3x} = 78. \end{cases}$$

$$254. \quad \begin{cases} \sqrt[4]{x+y} - \sqrt[4]{x-y} = a, & \text{kus } a > 0. \\ \sqrt{x+y} + \sqrt{x-y} = b^2, & \text{kus } b \text{ on reaalarv.} \end{cases}$$

$$255. \quad \begin{cases} \sqrt[3]{xy} (\sqrt[3]{x} + \sqrt[3]{y}) = 6 \\ x + y = 9. \end{cases}$$

$$256. \quad \begin{cases} \sqrt{4x + y - 3z + 7} = 2 \\ \sqrt[3]{2y + 5x + z + 15} = 3 \\ \sqrt{y + 2z} - \sqrt{8x} = 0 \dots \end{cases}$$

$$257. \quad \frac{1 - ax}{1 + ax} \sqrt{\frac{1 + bx}{1 - bx}} = 1.$$

$$258. \quad \sqrt[n]{\frac{a-x}{b+x}} + \sqrt[n]{\frac{b+x}{a-x}} = 2.$$

$$259. \quad \frac{\sqrt{1 + a^{-2}x^2} - xa^{-1}}{\sqrt{1 + a^{-2}x^2} + xa^{-1}} = \frac{1}{4}.$$

$$260. \quad \frac{\sqrt{1 + a^2x^2} - ax}{\sqrt{1 + a^2x^2} + ax} = \frac{1}{c^2}.$$

VASTUSED.

1.  $y \sqrt{a-1}$ , kui  $y > 0$ ;  $-y \sqrt{a-1}$ , kui  $y < 0$ .
2.  $(b^2 + 1) \sqrt{a^2 + 1}$ . 3.  $(b-1) \sqrt{b+1}$ , kui  $b > 1$ ;  
 $(1-b) \sqrt{b+1}$ , kui  $b < 1$ . 4.  $(2y-1) \sqrt{y+4}$ ,  
 kui  $y > \frac{1}{2}$ ;  $(1-2y) \sqrt{y+4}$ , kui  $y < \frac{1}{2}$ .
5.  $(y+3) \sqrt{y-6}$ . 6.  $(b^2+4) \sqrt{y}$ . 7.  $-x \sqrt{a^2-1}$ .
8.  $x \sqrt{y^2+y+1}$ , kui  $x > 0$ ;  $-x \sqrt{y^2+y+1}$ , kui  $x < 0$ .
9.  $(x^2-x+1) \sqrt{x-1}$ . 10.  $-\sqrt{(m-1)^2(m-2)}$ .
11.  $\sqrt{x^2-9}$ . 12.  $\sqrt{(x^2-x+4)^2(x-1)}$ .
13.  $-\sqrt{(3-m)^2(m-7)}$ . 14.  $\sqrt{3(x^2-5)}$ . 15.  $\sqrt{5} + \sqrt{7} + \sqrt{11}$ .
16.  $2 - 2\sqrt{2} - \sqrt{5} + \sqrt{10}$ . 17.  $\frac{1}{2}(\sqrt{30} + \sqrt{5})$ .
18.  $(\sqrt{2}+1)(2\sqrt{6}-5)$ . 19.  $\frac{1}{5}(\sqrt[3]{2} + \sqrt[3]{3})$ .
20.  $\frac{1}{2}(\sqrt{3} + \sqrt{2})(\sqrt{5} - \sqrt{7})$ . 21.  $\frac{1}{x+y}$ . 22.  $\frac{1}{abc}$ .
23.  $\frac{1}{n}(n^2+n+1)$ . 24.  $\frac{1}{8}$ . 25.  $\frac{x+\frac{1}{2}}{(2y-x)(2x^2+y+2)}$ .
26.  $\sqrt{x^2+a}$ . 27.  $-\frac{a^2}{4(x-a^2)}$ . 28.  $-2\sqrt[3]{x}$ .
29.  $b(a^3-b^3)$ . 30.  $\sqrt{x^2-4x}$ . 31. 0. 32.  $\frac{x^2+\frac{1}{x^4}+\frac{1}{x^2}+1}{x^4+x^2+1}$ .
33.  $n^2$ . 34.  $b$ . 35.  $\sqrt{1-x^2}$ . 36.  $-\frac{1}{\sqrt{2x-1}}$ .
37.  $\sqrt{a(1-a)}$ . 38.  $\frac{1}{\sqrt{3}}$ . 39. 2. 40.  $\frac{1}{3}(9+\sqrt{2})$ .
41.  $\frac{1}{2} \sqrt[3]{n^2(n^2-\sqrt{n^4-1})}$ . 42.  $n(n-1)$ . 43. 0.

44.  $(\frac{1}{\sqrt{k}} + 1) \sqrt{k-1}$ . 45.  $n$ , kui  $n \geq 1$ ;  $\frac{1}{n}$ , kui  $n < 1$ .
46.  $2$ , kui  $a > 1$ ;  $0$ , kui  $a < 1$ ; ei oma mõtet, kui  $a = 1$ .
47.  $2$ , kui  $a > 1$ ;  $-2$ , kui  $a < 1$ ; ei oma mõtet, kui  $a = 1$ .
48.  $2\sqrt{x-1}$ , kui  $x > 2$ ;  $2$ , kui  $1 < x \leq 2$ . 49.  $\frac{a}{b}$ , kui  $a \geq b$ ;  $\frac{b}{a}$ , kui  $a < b$ . 50.  $\frac{2\sqrt{a-1}}{a-2}$ , kui  $a > 2$ ;  
 $\frac{2}{2-a}$ , kui  $1 < a < 2$ . 51.  $\frac{1}{\sqrt{2}}(\sqrt{2x-1} - 1)$ , kui  $x > 1$ ;  
 $\frac{1}{\sqrt{2}}(1 - \sqrt{2x-1})$ , kui  $\frac{1}{2} \leq x < 1$ . 52.  $2a$ , kui  $a > \sqrt{2}$ ;  
 $2\sqrt{2}$ , kui  $-2 \leq a \leq 2$ ;  $-2a$ , kui  $a < -\sqrt{2}$ .
71. a)  $28x^2 - 20x + 1 = 0$ ; b)  $bx^2 - 2aax + a^2 = 0$ .
72. a)  $x^4 - 16x^2 + 4 = 0$ ; b)  $x^4 + 4x^2 - 45 = 0$ .
73.  $acy^2 - (b^2 - 2ac)y + ac = 0$ . 74. 1)  $ay^2 + 2by + 4c = 0$ ;  
 2)  $cy^2 + by + a = 0$ . 78.  $p = \pm 7$ . 79.  $3b^2 = 16ac$ .
80.  $k = \frac{2}{3}$ . 81.  $2b^2 = 9ac$ . 82.  $p^2 - 4q - a^2 = 0$ .
88.  $\pm 5$ ;  $\pm 3$ . 89.  $\pm 2$ ;  $\pm 1\sqrt{\frac{5}{2}}$ . 90.  $\pm 3$ ;  $\pm 1\sqrt{9,4}$ .
91.  $3$ ;  $-2$ . 92.  $\sqrt[3]{3}$ ;  $-2$ . 93.  $\pm 2$ . 94.  $\pm 2$ ;  $\pm 4$ .
95.  $\pm(\sqrt{10} \pm \sqrt{2})$ . 96.  $3$ ;  $-2$ ;  $0,5 \pm 1\sqrt{1,75}$ .
97.  $0$ ;  $-6$ ;  $-3 \pm \sqrt{31}$ . 98.  $1$ ;  $-2,5$ ;  $-2$ ;  $0,5$ .
99.  $1$ ;  $\frac{1}{2}(1 + \sqrt{5} \pm \sqrt{2 + 2\sqrt{5}})$ . 100.  $4$ ;  $-5$ ;  $\frac{1}{2}(-1 \pm 1\sqrt{23})$ .
101.  $-2$ ;  $-2 \pm \frac{\sqrt{10}}{3}$ . 102.  $\frac{-9 \pm \sqrt{17}}{2}$ ;  $\frac{-9 \pm 1\sqrt{7}}{2}$ .
103.  $\pm 2$ ;  $\pm 3$ . 104.  $-2$ ;  $-4$ ;  $\frac{-5 \pm 1\sqrt{7}}{2}$ . 105.  $-1$ ;  $-2 \pm \sqrt{5}$ .
106.  $-3$ ;  $1$ ;  $-1 \pm \sqrt{2}$ . 107.  $-4 \pm \sqrt{-3 + \sqrt{10}}$ . 108.  $1$ ;  $-3$ ;  
 $-1 \pm \sqrt{3}$ . 109.  $-2$ ;  $1 \pm \sqrt{3}$ . 110.  $\frac{1}{2}(3 \pm \sqrt{5})$ ;  
 $\frac{1}{2}(-3 \pm \sqrt{5})$ . 111.  $2$ ;  $-5$ . 112. Lahendeid ei ole.

113. 2. 114.  $4\frac{1}{2}$ ;  $-5\frac{1}{2}$ . 115.  $\pm 2$ . 116.  $\pm\sqrt{3}$ .
117. Lahendeid ei ole. 118. 1. 119. 2; -4;  $-1 \pm 2\sqrt{2}$ .
120.  $\frac{1 \pm \sqrt{13}}{2}$ . 121. a. 122. Lahendeid ei ole.
123. 5; -1;  $\frac{1}{5}$ . 124. 5;  $\frac{1}{5}$ ;  $\frac{-3 \pm 4i}{5}$ . 125. 2; 3;  $\frac{1}{2}$ ;  $\frac{1}{3}$ .
126.  $\frac{1 \pm 2i}{5}$ ;  $\frac{1 \pm \sqrt{19}i}{2 \cdot 5}$ . 127. 6; -7;  $-\frac{1}{6}$ ;  $\frac{1}{7}$ . 128.  $\pm 1$ ;  
 $\frac{3 \pm \sqrt{5}}{2}$ . 129. -1. 130. -1;  $\frac{3 \pm \sqrt{7}i}{4}$ ;  $\frac{-1 \pm \sqrt{3}i}{2}$ .
131.  $\pm 2$ . 132. 4. 133. Lahendeid ei ole. 134. 1;  
 3; 5. 135. Lahendeid ei ole. 136. Lahendeid ei  
 ole. 137.  $1 < x < 2$ . 138. 0; 2. 139. 0; 2;  
 $2\frac{1}{2}$ ;  $-\frac{1}{4}$ . 140. 2; -1;  $\frac{2}{3}$ ;  $-\frac{3}{4}$ . 141. 0;  $-1\frac{1}{4}$ ;  $-2\frac{1}{2}$ .
142. 2; 4. 143. Lahendeid ei ole. 144. 1;  $5\frac{1}{2}$ . 145. 1.
146.  $\frac{3}{2a^2}$ . 147.  $\frac{3}{4}$ . 148.  $\frac{b}{b-a}$ ;  $\frac{a}{b-a}$ . 149.  $\frac{b}{2}$ ;  $-\frac{b}{6}$ .
150.  $2a + b$ ;  $2a - b$ . 151.  $\pm a\sqrt{2}$ . 152.  $\frac{n^2}{8}$ .
153.  $\frac{a+b}{a-b}$ . 154. 1;  $\frac{a-1}{a+1}$ . 155.  $a + b + c$ . 156.  $\frac{2m}{8}$ ;  
 $\frac{3n}{8}$ . 157.  $2n - a$ ;  $2a - n$ . 158.  $\frac{7b(b-a)}{3(b-3a)}$ .
159. 0. 160.  $2a$ . 161.  $4m$ . 162.  $\pm \frac{1}{2}\sqrt{2m}$ ;  $\pm \frac{1}{2}\sqrt{22m}$ ,  
 $m > 0$ . 163.  $\sqrt{-2 \pm \sqrt{8n - n^2}}$ , kui  $n \neq 1$ .
164.  $(a - 1 \pm \sqrt{2a - 1})$ , kui  $a \geq \frac{1}{2}$ . 165.  $\pm(\sqrt{a} \pm n)$ ,  
 kui  $a \geq 0$ . 166.  $(a + b)^2$ , kui  $a + b > 0$ ;  $-(a + b^2)$ ,  
 kui  $a + b < 0$ . 167.  $(-3, 2)$ . 168.  $(\frac{1}{2}; 1; \frac{1}{5})$ .
169.  $-(a + b + c)$ ;  $ab + bc + ca$ ;  $-abc$ .
170.  $\left( \frac{(c-d)(b-d)}{(c-a)(b-a)} ; \frac{(a-d)(c-d)}{(c-b)(a-b)} ; \frac{(b-d)(a-d)}{(b-c)(a-c)} \right)$ .

171.  $\left( \frac{c-b}{a+b+c}; \frac{a-c}{a+b+c}; \frac{b-a}{a+b+c} \right)$ . 172. (1; 2; 3).  
 173. (5, 2); ( $\pm 1\sqrt{2}; -25$ ). 174. (2, 3); (3, 2).  
 175. (2, 3); (3, 2); (1, 5); (5, 1). 176. (3;  $\pm 2$ ); (4;  $\pm\sqrt{3}$ ).  
 177. ( $\pm 4; \pm 3$ ); ( $\pm 31; \pm 41$ ). 178. ( $\mp 3; \pm 6$ ); ( $\pm 6; \pm 3$ ).  
 179. ( $\pm 2; \pm 1$ ). 180. ( $\pm 3; \pm 2$ ); ( $\pm 2\sqrt{2}; \frac{\mp 3\sqrt{2}}{2}$ ). 181. ( $\pm 4; \pm 5$ );  
 ( $\pm 3\sqrt{3}; \pm\sqrt{3}$ ). 182. ( $\pm 2; \pm 3$ ); ( $\pm 3; \pm 2$ ). 183. ( $\pm 3; \pm 1$ );  
 ( $\pm\sqrt{2}; \mp 2\sqrt{2}$ ). 184. ( $\pm 1; \pm 2; \pm 3$ ). 185. ( $\pm 1; \pm 2; \pm 3$ ).  
 186. (1; 4; 5); (-1; 6; 7). 187. (4; 6); (6; 4).  
 188. (3; 4); (4; 3). 189. (3; 2). 190. (4; 2); (2; 4).  
 191. (3; 2); (-2; -3). 192. (1; 2); (1; -3).  
 193. (2; 4); ( $6\frac{1}{12}; -5\frac{11}{12}$ ). 194. (5; 1); (1; 5).  
 195. ( $0; \pm \frac{1}{\sqrt{3}}$ ); ( $\pm 1; \pm 1$ ). 196. ( $\pm 1; \pm 1$ ); ( $\pm 2\sqrt{2}; \frac{\pm 3}{2\sqrt{2}}$ ).  
 197. ( $\pm\sqrt{2}; \pm\sqrt{2}$ ); ( $\mp \frac{6}{\sqrt{17}}; \frac{\pm\sqrt{17}}{2}$ ). 198. (2; 1); ( $-2\frac{3}{8}; -1\frac{5}{8}$ ).  
 199. (10; 7); (-7; -10). 200. ( $2\frac{1}{2}; 1\frac{1}{2}$ ); ( $1\frac{1}{2}; 2\frac{1}{2}$ ).  
 201. ( $\frac{\sqrt[3]{3}}{3}; \frac{2\sqrt[3]{3}}{3}$ ); ( $\frac{\sqrt[3]{4}}{2}; \frac{\sqrt[3]{4}}{2}$ ). 202. ( $\pm 1, 86; \mp 4, 84$ );  
 ( $\pm 5; \pm 4$ ). 203. (1; -1); (2; -2); (3; -3).  
 204. (3; 3; 3). 205.  $\left( \frac{2a^2bc}{ab+ac-bc}; \frac{2b^2ca}{bc+ba-ca}; \frac{2c^2ab}{ca+cb-ab} \right)$  206. ( $\frac{1}{\sqrt{3}}; \frac{1}{\sqrt{6}}; \frac{1}{\sqrt{2}}$ ).  
 207. ( $\pm 4; \pm 3; \pm 5$ ); ( $\pm 3; \pm 4; \pm 5$ ); ( $\frac{\pm 7 - \sqrt{113}}{2}; \frac{\pm 7 + \sqrt{113}}{2}; \pm 9$ ).  
 208. ( $\pm a \sqrt{\frac{5-1}{2}}; \pm a \sqrt{\frac{5+1}{2}}; \frac{\pm a}{\sqrt{5-2}}$ ). 209. (0; 0; 0);  
 (2; 3; 1); (3; 2; 1). 210. ( $\pm 2; \pm 4; \pm 6$ ). 211. Lahendeid  
 ei ole. 212. 7. 213. Lahendeid ei ole.  
 214. 6. 215. -1. 216. 7;  $2\frac{13}{25}$ . 217. Lahendeid

ei ole. 218. Lahendeid ei ole. 219. 0.

220.  $1; -2\frac{2}{3}$ . 221.  $1; \frac{1}{2}$ . 222.  $0; 5$ . 223.  $1\frac{1}{2} < x \leq 3$ .

224.  $1; 4$ . 225.  $0; \frac{16}{25}$ . 226.  $21$ . 227.  $15$ .

228.  $2; 3$ . 229.  $\frac{2}{7}; 5$ ; 230.  $0; \frac{63}{65} a$ . 231.  $a^2 - \frac{(b-2a)^3}{27b}$ .

232.  $\frac{a+b+\sqrt{(a+b)^2-5(a-b)^2}}{5}$ . 233.  $0; \frac{3}{4}$ , kui

$a > 0$ . 234.  $1; \frac{5}{3}$ . 235.  $1\frac{9}{16}$ . 236.  $\frac{3}{31}; -\frac{1}{11}$ .

237.  $\frac{3}{4}$ . 238.  $0; 1\frac{7}{9}$ . 239.  $4; 25$ . 240.  $\pm 27$ .

241.  $2; 3$ . 242.  $6; 243. 5$ . 244.  $-1; \frac{9}{16}$ . 245.  $2; -1, \frac{3}{5}$ . 246.  $16; -25$ . 247.  $3$ . 248.  $-4; 6$ .

249.  $(8; 2); (2; -8)$ . 250.  $(4; 1); (-9; -2\frac{1}{4})$ . 251.  $(17; 6)$ .

252.  $(30; 6); (35; 1)$ . 253.  $(4; 9); (9; 4)$ .

254.  $(\frac{b^4+2a^2b^2-a^4}{4}; \frac{ab^2}{2}\sqrt{2b^2-a^2})$ . 255.  $(8; 1);$

$(1; 8)$ . 256.  $(1; 2; 3)$ . 257.  $0; \sqrt{\frac{2a-b}{a^2b}}$ , kui

$\frac{1}{2} < \frac{a}{b} < 1$ . 258.  $\frac{a-b}{2}$ . 259.  $\frac{3}{4} a$ .

260.  $\frac{c^2-1}{2ac}$ , kui  $c \geq 0$ ;  $\frac{1-c^2}{2ac}$ , kui  $c < 0$ .

SISUKORD.

	Lk.
SISSEJUHATUS	
1. Algebralised teisendused . . . . .	4
2. Algebralised võrrandid . . . . .	10
VASTUSED . . . . .	25

Hind rbl. 0.60

1961.a. - rbl. 0.06

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TÜ RAAMATUKOGU



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