Повторим формулы - $ax^2+bx+c;\ x_1'\cdot x_2'=ac;\ x_1'+x_2'=-b;\ x_1=\frac{x_1'}{a};\ x_2=\frac{x_2'}{a};$

$a+b+c=0\rightarrow\ x_1=1;\ x_2=\frac{c}{a};\qquad a+c=b\rightarrow\ x_1=-1;\ x_2=-\frac{c}{a}$

Теорема Виета - $x^2+bx+c=0;\ x_1+x_2=-b;\ x_1\cdot x_2=c;$

1. $\boldsymbol{281x^2+131x-150=0};\ 281-150=131;\ \boldsymbol{x_1=-1};\ \boldsymbol{x_2}=-\left(-\frac{\boldsymbol{150}}{\boldsymbol{281}}\right)=\frac{\boldsymbol{50}}{\boldsymbol{97}}$

Проверка: $281\cdot\left(\frac{150}{281}\right)^2+(281-150)\frac{150}{281}-150=\frac{150^2}{281}+150-\frac{150^2}{281}-150=0$

Для (-1) проверите сами!

2. $\boldsymbol{x^2-54x+713=0};\quad x_1\cdot x_2=23\cdot 31=713;\ \ x_1+x_2=23+31=54$ - теорема Виета. $\boldsymbol{x_1=23};\ \boldsymbol{x_2=31};$

3. $\boldsymbol{19x^2-176x+301=0};\ x_1'\cdot x_2'=19\cdot 301=19\cdot 43\cdot 7=133\cdot 43;\ x_1'+x_2'=133+43=176;$

$$\boldsymbol{x_1=\frac{133}{19}=7};\ \boldsymbol{x_2=\frac{43}{19}};$$

Проверка: $19\cdot 7^2-(133+43)\cdot 7+301=19\cdot 7^2-19\cdot 7\cdot 7-43\cdot 7+43\cdot 7=0$

$$19\cdot\left(\frac{43}{19}\right)^2-(133+43)\frac{43}{19}+301=\frac{43^2}{19}-7\cdot 43-\frac{43^2}{19}+301=0$$

4. $\boldsymbol{249x^2-151x-98=0};\ 249-151-98=0;\ \boldsymbol{x_1=1};\ \boldsymbol{x_2=-\frac{98}{249}}$

Проверка: $249 \cdot \left(\frac{98}{249}\right)^2 - (249-98) \cdot \left(-\frac{98}{249}\right) - 98 = \frac{98^2}{249} + 98 - \frac{98^2}{249} - 98 = 0$

Для 1 проверите сами!

5. $\boldsymbol{17x^2 + 72x - 65 = 0}$; $x_1' \cdot x_2' = 17 \cdot (-65) = 17 \cdot 13 \cdot (-5) = (-85) \cdot 13$; $x_1' + x_2' = 13 - 85 = -72$;

$$\boldsymbol{x_1 = \frac{13}{17} = 7};\ \boldsymbol{x_2 = -\frac{85}{17} = -5};$$

Проверка: $17 \cdot 5^2 + (85-13) \cdot (-5) - 65 = 17 \cdot 5^2 - 17 \cdot 5 \cdot 5 + 65 - 65 = 0$

$$17 \cdot \left(\frac{13}{17}\right)^2 + (85-13) \cdot \frac{13}{17} - 65 = \frac{13^2}{17} + 65 - \frac{13^2}{17} - 65 = 0$$

6. $\boldsymbol{x^2 - 72x + 1247 = 0}$; $x_1 \cdot x_2 = 29 \cdot 43$; $x_1 + x_2 = 29 + 43 = 72$; $\boldsymbol{x_1 = 29}$; $\boldsymbol{x_2 = 43}$

7. $\boldsymbol{7x^2 - 43x + 6 = 0}$; $x_1' \cdot x_2' = 7 \cdot 6 = 42 \cdot 1$; $x_1' + x_2' = 42 + 1 = 43$; $\boldsymbol{x_1 = \frac{42}{7} = 6}$; $\boldsymbol{x_2 = \frac{1}{7}}$;

Проверка: $7 \cdot 6^2 - (42+1) \cdot 6 + 6 = 7 \cdot 6^2 - 7 \cdot 6 \cdot 6 - 6 + 6 = 0$

$$7 \cdot \left(\frac{1}{7}\right)^2 - (42+1) \cdot \frac{1}{7} + 6 = \frac{1}{7} - 6 - \frac{1}{7} + 6 = 0$$

8. $\boldsymbol{24x^2 - 46x + 21 = 0}$; $x_1' \cdot x_2' = 24 \cdot 21 = 6 \cdot 4 \cdot 7 \cdot 3 = 28 \cdot 18$; $x_1' + x_2' = 28 + 18 = 46$;

$$\boldsymbol{x_1 = \frac{28}{24} = \frac{7}{6};\ x_2 = \frac{18}{24} = \frac{3}{4};}$$

Проверка: $24 \cdot \left(\frac{28}{24}\right)^2 - (28 + 18) \cdot \frac{28}{24} + 21 = \frac{28^2}{24} - \frac{28^2}{24} - 18 \cdot \frac{7}{6} + 21 = 0$

9. $\boldsymbol{x^2 - 30x + 221 = 0}$; $x_1 \cdot x_2 = 221 = 13 \cdot 17$; $x_1 + x_2 = 13 + 17 = 30$; $\boldsymbol{x_1 = 13}$; $\boldsymbol{x_2 = 17}$

10. $\boldsymbol{1247x^2 - 736x - 511 = 0}$; $1247 - 736 - 511 = 0$; $\boldsymbol{x_1 = 1}$; $\boldsymbol{x_2 = -\frac{511}{1247}}$

Проверка: $1247 \cdot \left(\frac{511}{1247}\right)^2 - (1247 - 511) \cdot \left(-\frac{511}{1247}\right) - 511 = \frac{511^2}{1247} + 511 - \frac{511^2}{1247} - 511 = 0$

11. $\boldsymbol{516x^2 + x - 2062 = 0}$; $x_1' \cdot x_2' = 516 \cdot (-2062) = 516 \cdot (-2) \cdot 1031 = (-1032) \cdot 1031$;

$$x_1' + x_2' = 1031 - 1032 = -1;\ \boldsymbol{x_1 = -\frac{1032}{516} = -2};\ \boldsymbol{x_2 = \frac{1031}{516}};$$

Проверка: $516 \cdot \left(\frac{1031}{516}\right)^2 + (1032 - 1031) \cdot \frac{1031}{516} - 2062 = \frac{1031^2}{516} + 2062 - \frac{1031^2}{516} - 2062 = 0$

12. $\boldsymbol{28x^2 - 65x + 33 = 0}$; $x_1' \cdot x_2' = 28 \cdot 33 = 4 \cdot 7 \cdot 3 \cdot 11 = 44 \cdot 21$; $x_1' + x_2' = 44 + 21 = 65$;

$$\boldsymbol{x_1 = \frac{44}{28} = \frac{11}{7};\ x_2 = \frac{21}{28} = \frac{3}{4}}$$

Проверка: $28 \cdot \left(\frac{44}{28}\right)^2 - (44 + 21) \cdot \frac{44}{28} + 33 = \frac{44^2}{28} - \frac{44^2}{28} - 3 \cdot 11 + 33 = 0$

13. $\boldsymbol{73x^2 - 175x + 58 = 0}$; ; $x_1' \cdot x_2' = 73 \cdot 58 = 73 \cdot 2 \cdot 29 = 146 \cdot 29$; $x_1' + x_2' = 146 + 29 = 175$;

$$\boldsymbol{x_1 = \frac{146}{73} = 2};\ \boldsymbol{x_2 = \frac{29}{73}};$$

Проверка: $73 \cdot \left(\frac{29}{73}\right)^2 - (146 + 29) \cdot \frac{29}{73} + 58 = \frac{29^2}{73} - 2 \cdot 29 - \frac{29^2}{73} + 58 = 0$

14. $\boldsymbol{28x^2 - 104x + 21 = 0}$; $x_1' \cdot x_2' = 28 \cdot 21 = 14 \cdot 2 \cdot 7 \cdot 3 = 98 \cdot 6$; $x_1' + x_2' = 98 + 6 = 104$;

$$\boldsymbol{x_1 = \frac{98}{28} = \frac{7}{2}};\ \boldsymbol{x_2 = \frac{6}{28} = \frac{3}{14}};$$

Проверка: $28 \cdot \left(\frac{98}{28}\right)^2 - (98 + 6) \cdot \frac{98}{28} + 58 = \frac{98^2}{28} - \frac{98^2}{28} - 3 \cdot 7 + 21 = 0$

15. $\boldsymbol{37x^2 - 166x - 95 = 0}$; $x_1' \cdot x_2' = 37 \cdot (-95) = 37 \cdot 5 \cdot (-19) = 185 \cdot (-19)$;

$$x_1' + x_2' = 185 - 19 = 104;\ \boldsymbol{x_1 = \frac{185}{37} = 5};\ \boldsymbol{x_2 = -\frac{19}{37}};$$

Проверка: $37 \cdot \left(\frac{19}{37}\right)^2 - (185 - 19) \cdot \left(-\frac{19}{37}\right) - 95 = \frac{19^2}{37} + 5 \cdot 19 - \frac{19^2}{37} - 95 = 0$

16. $\boldsymbol{57x^2 + 49x - 58 = 0}$; $x_1' \cdot x_2' = 57 \cdot (-58) = 19 \cdot 3 \cdot 2 \cdot (-29) = (-87) \cdot 38$; $x_1' + x_2' = 38 - 87 = -49$

$$\boldsymbol{x_1 = \frac{38}{57} = \frac{2}{3}};\ \boldsymbol{x_2 = -\frac{87}{57} = -\frac{29}{19}}$$

Проверка: $57 \cdot \left(\frac{87}{57}\right)^2 + (87 - 38) \cdot \left(-\frac{87}{57}\right) - 58 = \frac{87^2}{57} - \frac{87^2}{57} + 2 \cdot 29 - 58 = 0$

17. $\boldsymbol{98x^2 - 1079x + 11 = 0}$; $x_1' \cdot x_2' = 98 \cdot 11 = 1078 \cdot 1$; $x_1' + x_2' = 1078 + 1 = 1079$;

$$\boldsymbol{x_1 = \frac{1078}{98} = 11};\ \boldsymbol{x_2 = \frac{1}{98}}$$

Проверка: $98 \cdot 11^2 - (1078 + 1)11 + 11 = 1078 \cdot 11 - 1078 \cdot 11 - 11 + 11 = 0$

$$98 \cdot \left(\frac{1}{98}\right)^2 - (1078 + 1)\frac{1}{98} + 11 = \frac{1}{98} - \frac{1078}{98} - \frac{1}{98} + 11 = 0$$

18. $\boldsymbol{x^2 - 84x + 1763 = 0}$; $x_1 \cdot x_2 = 1763 = 41 \cdot 43$; $x_1 + x_2 = 41 + 43 = 84$; $\boldsymbol{x_1 = 41}$; $\boldsymbol{x_2 = 43}$

19. $\boldsymbol{98x^2 - 71x + 11 = 0}$; $x_1' \cdot x_2' = 98 \cdot 11 = 49 \cdot 2 \cdot 11 = 49 \cdot 22$; $x_1' + x_2' = 49 + 22 = 71$;

$$\boldsymbol{x_1 = \frac{49}{98} = \frac{1}{2}};\ \boldsymbol{x_2 = \frac{22}{98} = \frac{11}{49}}$$

Проверка: $98 \cdot \left(\frac{11}{49}\right)^2 - (49 + 22) \cdot \frac{11}{49} + 11 = 2 \cdot \frac{11^2}{49} - 11 - 2 \cdot \frac{11^2}{49} + 11 = 0$

20. $\boldsymbol{241x^2 - x - 2166 = 0}$; $x_1' \cdot x_2' = 241 \cdot (-2166) = 241 \cdot 3 \cdot (-722) = 723 \cdot (-722)$;

$$x_1' + x_2' = 723 - 722 = 1;\quad \boldsymbol{x_1 = \frac{723}{241} = 3};\ \boldsymbol{x_2 = -\frac{722}{241}}$$

Проверка: $241 \cdot \left(\frac{722}{241}\right)^2 - (723 - 722) \cdot \left(-\frac{722}{241}\right) - 2166 = \frac{722^2}{241} + 3 \cdot 722 - \frac{722^2}{241} - 2166 = 0$

21. $\mathbf{50x^2 + x - 13 = 0}$; $x_1' \cdot x_2' = 50 \cdot (-13) = 25 \cdot 2 \cdot (-13) = 25 \cdot (-26)$;

$$x_1' + x_2' = 25 - 26 = -1;\ \ \boldsymbol{x_1 = \frac{25}{50} = \frac{1}{2}};\ \ \boldsymbol{x_2 = -\frac{26}{50} = -\frac{13}{26}}$$

Проверка: $50 \cdot \left(\frac{26}{50}\right)^2 + (26 - 25) \cdot \left(-\frac{26}{50}\right) - 13 = \frac{26^2}{50} - \frac{26^2}{50} + 13 - 13 = 0$

22. $\mathbf{107x^2 + 36x - 71 = 0}$; $107 - 71 = 36$; $\boldsymbol{x_1 = -1}$; $\boldsymbol{x_2 = \frac{71}{107}}$

Проверка: $107 \cdot \left(\frac{71}{107}\right)^2 + (107 - 71) \cdot \frac{71}{107} - 71 = \frac{71^2}{107} + 71 - \frac{71^2}{107} - 71 = 0$

23. $\mathbf{213x^2 - 640x + 3 = 0}$; $x_1' \cdot x_2' = 213 \cdot 3 = 639 \cdot 1$; $639 + 1 = x_1' + x_2' = 640$; $\boldsymbol{x_1 = \frac{639}{213} = 3}$; $\boldsymbol{x_2 = \frac{1}{213}}$

Проверка: $213 \cdot 3 \cdot 3 - (639 + 1) \cdot 3 + 3 = 639 \cdot 3 - 639 \cdot 3 - 3 + 3 = 0$

$$213 \cdot \left(\frac{1}{213}\right)^2 - (639 + 1) \cdot \frac{1}{213} + 3 = \frac{1}{213} - 3 - \frac{1}{213} + 3 = 0$$

24. $\mathbf{51x^2 - 108x - 135 = 0}$; $x_1' \cdot x_2' = 51 \cdot (-135) = 51 \cdot 3 \cdot (-45) = 153 \cdot (-45)$;

$$153 - 45 = x_1' + x_2' = 108; \quad \boldsymbol{x_1 = \frac{153}{51} = 3};\ \boldsymbol{x_2 = -\frac{45}{51} = -\frac{15}{17}}$$

25. $\boldsymbol{97x^2 - 300x + 27 = 0}$; $x_1' \cdot x_2' = 97 \cdot 27 = 97 \cdot 3 \cdot 9 = 291 \cdot 9$; $x_1' + x_2' = 291 + 9 = 300$;

$$\boldsymbol{x_1 = \frac{291}{97} = 3};\ \boldsymbol{x_2 = \frac{9}{97}}$$

26. $\boldsymbol{83x^2 - 242x - 21 = 0}$; ; $x_1' \cdot x_2' = 83 \cdot (-21) = 83 \cdot 3 \cdot (-7) = 249 \cdot (-7)$; $x_1' + x_2' = 249 - 7 = 242$;

$$\boldsymbol{x_1 = \frac{249}{83} = 3};\ \boldsymbol{x_2 = -\frac{7}{83}}$$

27. $\boldsymbol{53x^2 - 146x - 39 = 0}$; ; $x_1' \cdot x_2' = 53 \cdot (-39) = 53 \cdot 3 \cdot (-13) = 159 \cdot (-13)$; $x_1' + x_2' = 159 - 13 = 146$;

$$\boldsymbol{x_1 = \frac{159}{53} = 3};\ \boldsymbol{x_2 = -\frac{13}{53}}$$

28. $\boldsymbol{83x^2 - 582x + 7 = 0}$; $x_1' \cdot x_2' = 83 \cdot 7 = 581 \cdot 1$; $x_1' + x_2' = 581 + 1 = 582$; $\boldsymbol{x_1 = \frac{581}{83} = 7};\ \boldsymbol{x_2 = \frac{1}{83}}$

29. $\boldsymbol{514x^2 - 255x - 1 = 0}$; $x_1' \cdot x_2' = 514 \cdot (-1) = 257 \cdot (-2)$; $x_1' + x_2' = 257 - 2 = 255$;

$$\boldsymbol{x_1 = \frac{257}{514} = \frac{1}{2}};\ \boldsymbol{x_2 = -\frac{2}{514} = -\frac{1}{257}}$$

30. $\boldsymbol{531x^2 - 180x + 1 = 0}$; $x_1' \cdot x_2' = 531 \cdot 1 = 177 \cdot 3$; $x_1' + x_2' = 177 + 3 = 180$;

$$\boldsymbol{x_1 = \frac{177}{531} = \frac{1}{3}};\ \boldsymbol{x_2 = \frac{3}{531} = \frac{1}{177}}$$

31. $\boldsymbol{x^2 - 36x + 323 = 0}$; $x_1 \cdot x_2 = 323 = 17 \cdot 19$; $x_1 + x_2 = 17 + 19 = 34$; $\boldsymbol{x_1 = 17}$; $\boldsymbol{x_2 = 19}$

32. $\boldsymbol{x^2 - 114x + 3233 = 0}$; $x_1 \cdot x_2 = 3233 = 61 \cdot 53$; $x_1 + x_2 = 61 + 53 = 114$; $\boldsymbol{x_1 = 61}$; $\boldsymbol{x_2 = 53}$

33. $\boldsymbol{4x^2 - 1941x - 1945 = 0}$; $4 - 1945 = -1941 \rightarrow \boldsymbol{x_1 = -1}$; $\boldsymbol{x_2 = \frac{1945}{4} = 486,25}$

34. $\boldsymbol{2015x^2 - 2016x + 1 = 0}$; $2015 - 2016 + 1 = 0$; $\boldsymbol{x_1 = 1}$; $\boldsymbol{x_2 = \frac{1}{2015}}$

35. $\boldsymbol{2013x^2 - 1345x + 2 = 0}$; $x_1' \cdot x_2' = 2013 \cdot 2 = 671 \cdot 3 \cdot 2 = 1342 \cdot 3$; $x_1' + x_2' = 1342 + 3 = 1345$;

$$\boldsymbol{x_1 = \frac{1342}{2013} = \frac{2}{3}};\ \boldsymbol{x_2 = \frac{3}{2013} = \frac{1}{671}}$$

36. $\boldsymbol{307x^2 - 617x + 6 = 0}$; $x_1' \cdot x_2' = 307 \cdot 6 = 307 \cdot 2 \cdot 3 = 614 \cdot 3$; $614 + 3 = x_1' + x_2' = 617$;

$$\boldsymbol{x_1 = \frac{614}{307} = 2;\ \ x_2 = \frac{3}{307}}$$

37. $\boldsymbol{1971x^2 - 228x + 1 = 0}$; $x_1' \cdot x_2' = 1971 \cdot 1 = 219 \cdot 9$; $x_1' + x_2' = 219 + 9 = 228$;

$$\boldsymbol{x_1 = \frac{219}{1971} = \frac{1}{9};\ \ x_2 = \frac{9}{1971} = \frac{1}{219}}$$

38. $\boldsymbol{x^2 - 90x + 1349 = 0}$; $x_1 \cdot x_2 = 1349 = 71 \cdot 19$; $x_1 + x_2 = 71 + 19 = 90$; $\boldsymbol{x_1 = 71;\ x_2 = 19}$

39. $\boldsymbol{1641x^2 - 2000x + 359 = 0}$; $1641 - 2000 + 359 = 0$; $\boldsymbol{x_1 = 1;\ x_2 = \frac{359}{1641}}$

40. $\boldsymbol{19x^2 - 360x - 19 = 0}$; $x_1' \cdot x_2' = 19 \cdot (-19) = 361 \cdot (-1)$; $x_1' + x_2' = 361 - 1 = 360$;

$$\boldsymbol{x_1 = \frac{361}{19} = 19;\ \ x_2 = \frac{1}{19}}$$

41. $\boldsymbol{13x^2 - 67x + 10 = 0}$; $x_1' \cdot x_2' = 13 \cdot 10 = 13 \cdot 5 \cdot 2 = 65 \cdot 2$; $x_1' + x_2' = 65 + 2 = 67$; $\boldsymbol{x_1 = \frac{65}{13} = 5;\ \ x_2 = \frac{2}{13}}$

42. $\boldsymbol{17x^2 - 147x + 88 = 0}$; $x_1' \cdot x_2' = 17 \cdot 88 = 17 \cdot 8 \cdot 11 = 136 \cdot 11$; $x_1' + x_2' = 136 + 11 = 147$;

$$\boldsymbol{x_1 = \frac{136}{17} = 8;\ \ x_2 = \frac{11}{17}}$$

43. $\boldsymbol{18x^2 - 119x - 49 = 0}$; $x_1' \cdot x_2' = 18 \cdot (-49) = 18 \cdot 7 \cdot (-7) = 126 \cdot (-7)$; $x_1' + x_2' = 126 - 7 = 67$;

$$\boldsymbol{x_1 = \frac{126}{18} = 7;\ \ x_2 = -\frac{7}{18}}$$

44. $\boldsymbol{1751x^2 - 1229x - 522 = 0}$; $1751 - 1229 - 522 = 0$ $\quad \boldsymbol{x_1 = 1;\ \ x_2 = -\frac{522}{1751}}$

45. $\boldsymbol{x^2 - 94x + 1633 = 0}$; $x_1 \cdot x_2 = 1633 = 71 \cdot 23$; $x_1 + x_2 = 71 + 23 = 94$; $\quad \boldsymbol{x_1 = 71;\ x_2 = 23}$

46. $\boldsymbol{111x^2 - 40x + 1 = 0}$; $x_1' \cdot x_2' = 111 \cdot 1 = 37 \cdot 3$; $x_1' + x_2' = 37 + 3 = 40$; $\boldsymbol{x_1 = \frac{37}{111} = \frac{1}{3};\ \ x_2 = \frac{3}{111} = \frac{1}{37}}$

47. $\boldsymbol{x^2 - 104x + 1023 = 0}$ $x_1 \cdot x_2 = 1023 = 93 \cdot 11$; $x_1 + x_2 = 93 + 11 = 104$; $\quad \boldsymbol{x_1 = 93;\ x_2 = 11}$

48. $\boldsymbol{23x^2 - 527x - 46 = 0}$; $x_1' \cdot x_2' = 23 \cdot (-46) = 23 \cdot 23 \cdot (-2) = 529 \cdot (-2)$; $x_1' + x_2' = 529 - 2 = 527$;

$$\boldsymbol{x_1 = \frac{529}{23} = 23;\ \ x_2 = -\frac{2}{23}}$$