

## Домашнее задание

1.  $\frac{x^2 + 5x + 6}{x^3 + 3x^2 + 2x} = 0$   $x = -3$
2.  $\frac{x^3 + 2x^2 - x - 2}{x^3 + x^2 - 4x - 4} = 0$   $x = 1$
3.  $\frac{2x - 3}{x - 1} + 1 = \frac{6x - x^2 - 6}{x - 1}$   $x = 2$
4.  $\frac{x^2 + 1}{3x^2 - 2} = 2x$   $\left\{-\frac{1}{2}, -\frac{1}{3}, 1\right\}$
5.  $\frac{x + 1}{2(x - 1)} = \frac{9}{2(x + 4)} + \frac{1}{x - 1}$   $x = 5$
6.  $\frac{x^2 + x + 1}{x^2 - x + 1} = \frac{7}{9} \cdot \frac{x + 1}{x - 1}$   $x = 2$
7.  $\frac{1}{2x - 2} - \frac{2x - 1}{x^2 + x + 1} + \frac{3}{2x + 2} = 0$   $\left\{-2, \frac{1}{2}\right\}$
8.  $\frac{12x + 1}{6x - 2} - \frac{9x - 5}{3x + 1} = \frac{108x - 36x^2 - 9}{4(9x^2 - 1)}$   $x = \frac{1}{2}$
9.  $\frac{12x^2 + 30x - 81}{16x^2 - 9} = \frac{3x - 7}{3 - 4x} + \frac{6x + 5}{4x + 3}$   $x = \frac{29}{3}$
10.  $\frac{x + 9}{x^2 - 3x - 10} - \frac{x + 15}{x^2 - 25} = \frac{1}{x + 2}$   $x = -8$
11.  $\frac{x^2 + 5}{x^3 - 3x - 2} = \frac{1}{x - 2} - \frac{2}{(x + 1)^2}$   $x \neq -1, x \neq 2$
12.  $\frac{3}{2x + 1} - \frac{x + 1}{x + 0,5} - 1 = \frac{x}{2} \left( \frac{3}{2(x + 0,5)} - \frac{2x + 2}{2x + 1} - 1 \right)$   $\{0, 2\}$
13.  $\frac{2x - 1}{x + 1} + \frac{3x - 1}{x + 2} = \frac{x - 7}{x - 1} + 4$   $\left\{-\frac{5}{4}, 5\right\}$
14.  $31 \left( \frac{24 - 5x}{x + 1} + \frac{5 - 6x}{x + 4} \right) + 370 = 29 \left( \frac{17 - 7x}{x + 2} + \frac{8x + 55}{x + 3} \right)$   $x = -\frac{5}{2}$
15.  $\frac{x^2 + 2x + 2}{x + 1} + \frac{x^2 + 8x + 20}{x + 4} = \frac{x^2 + 4x + 6}{x + 2} + \frac{x^2 + 6x + 12}{x + 3}$   $\left\{-\frac{5}{2}, 0\right\}$
16.  $\frac{(x - 1)(x - 2)(x - 3)(x - 4)}{(x + 1)(x + 2)(x + 3)(x + 4)} = 1$
17.  $\frac{x + 6}{x - 6} \left( \frac{x - 4}{x + 4} \right)^2 + \left( \frac{x - 6}{x + 6} \right) \left( \frac{x + 9}{x - 9} \right)^2 = 2 \frac{x^2 + 36}{x^2 - 36}$   $\left\{0, \frac{6 \pm 6\sqrt{26}}{5}\right\}$

18.  $\frac{21}{x^2 - 4x + 10} - x^2 + 4x = 6$   $\{1, 3\}$
19.  $\frac{x^2 + 2x + 1}{x^2 + 2x + 2} + \frac{x^2 + 2x + 2}{x^2 + 2x + 3} = \frac{7}{6}$   $\{-2, 0\}$
20.  $\frac{1}{x^2 - 2x + 2} + \frac{1}{x^2 - 2x + 3} = \frac{4,5}{x^2 - 2x + 4}$   $x = 1$
21.  $\frac{1}{x(x+2)} - \frac{1}{(x+1)^2} = \frac{1}{12}$   $\{-3, 1\}$
22.  $\frac{6}{(x+1)(x+2)} + \frac{8}{(x+4)(x-1)} = 1$   $\left\{-3, 0, -3 \pm \frac{\sqrt{73}}{2}\right\} ?$
23.  $\frac{24}{(x+4)(x-2)} - \frac{15}{(x+3)(x-1)} = 2$   $\left\{-2, 0, -3 \pm \frac{\sqrt{66}}{2}\right\} ?$
24.  $\frac{1}{x(x+1)} - \frac{4}{(2x+1)^2} = \frac{1}{18}$
25.  $\frac{6}{x} - \frac{16}{(x+2)^2} = 1 + \frac{6}{x+4}$   $\{-6, 2\}$
26.  $\frac{(x^2 - 6x)^2}{(x-3)^2} - 2 = \frac{81}{(x-3)^2}$   $x = 3 \pm 2\sqrt{5}$
27.  $x^3 - x^2 - \frac{8}{x^3 - x^2} = 2$
28.  $\frac{16}{x^3 + 3x^2 - x + 5} - \frac{5}{x^3 + 3x^2 - x + 2} = 1$   $\{-3, \pm 1\}$
29.  $\frac{1}{6x^2 - 7x + 2} + \frac{1}{12x^2 - 17x + 6} = 4x^2 - 5x$   $x = \frac{5 \pm \sqrt{33}}{8}$
30.  $x^2 + 3x + 2 = 15 \frac{x^2 + 5x + 10}{x^2 + 7x + 12}$   $\{-7, 2\}$
31.  $\frac{x^3 - 3x^2 - x - 7}{x-1} + \frac{2x^3 - 9x^2 + x + 32}{2x-3} = 1$   $\left\{-1, \frac{1}{2}, \frac{7}{2}, 2\right\}$
32.  $\frac{3x^3 - 11x^2 + 13x - 1}{3x-5} + \frac{3x^3 - 5x^2 + 7x - 1}{3x+1} + x^2 = 0$   $\left\{1, \frac{1}{2}, \frac{2}{3}\right\}$
33.  $\frac{2x}{2x^2 - 5x + 3} + \frac{13x}{2x^2 + x + 3} = 6$   $\left\{\frac{3}{4}, 2\right\}$
34.  $\frac{3x}{x^2 + 1 - 4x} - \frac{2x}{x^2 + 1 + x} = \frac{8}{3}$   $\left\{\frac{5 \pm \sqrt{21}}{2}\right\}$
35.  $\frac{x^2 - 10x + 15}{x^2 - 6x + 15} = \frac{4x}{x^2 - 12x + 15}$   $\{3, 5, 9 \pm \sqrt{66}\}$
36.  $\frac{x^2 - x + 2}{x} + \frac{x^4 + x^2 + 4}{x^2} = 8$   $\{1, 2, -2 \pm \sqrt{2}\}$
37.  $\frac{48}{x^2} + \frac{x^2}{3} = 10 \left(\frac{x}{3} - \frac{4}{x}\right)$   $\{-2, 6, 3 \pm \sqrt{21}\}$

$$38. 12x^2 + \frac{1}{3x^2} + 10\left(2x + \frac{1}{3x}\right) + 11 = 0$$

$$\left\{-1, -\frac{1}{6}\right\}$$

$$39. \left(x^3 + \frac{1}{x^3}\right) + \left(x^2 + \frac{1}{x^2}\right) + \left(x + \frac{1}{x}\right) = 6$$

$$x = 1$$

$$40. x^2 + \frac{36}{(x-2)^2} = 6\left(x - \frac{2}{x-2}\right) + 19$$

$$\left\{\frac{1}{2}, 2, \frac{-9 \pm \sqrt{65}}{4}\right\}$$

$$41. x^2 + \frac{25}{(x-4)^2} = 10\left(x - \frac{1}{x-4}\right) - 6$$

$$\{3, 9, 3 \pm \sqrt{6}\}$$

$$42. \frac{x(x-1)^2}{(x^2-x+1)^2} = \frac{2}{9}$$

$$\left\{\frac{1}{2}, 2, 2 \pm \sqrt{3}\right\}$$

$$43. 20\left(\frac{x-2}{x+1}\right)^2 - 5\left(\frac{x+2}{x-1}\right)^2 + 48\frac{x^2-4}{x^2-1} = 0$$

$$\left\{\frac{2}{3}, 3\right\}$$

$$44. \left(\frac{x+1}{x-1}\right)^2 - 2\frac{x-2}{x-1} - 3\left(\frac{x-2}{x+1}\right)^2 = 0$$

$$\left\{\frac{1}{2}, 5\right\}$$

$$45. \frac{9}{x^2} + \frac{9}{(x+2)^2} = 10$$

$$\{-3, 1\}$$

$$46. \left(\frac{x}{x+1}\right)^2 + \left(\frac{x}{x-1}\right)^2 = 90$$

$$\left\{\pm \frac{\sqrt{5}}{2}, \pm \frac{3\sqrt{11}}{11}\right\}$$

$$47. x^2 + \frac{81x^2}{(x+9)^2} = 40$$

$$\{1 \pm \sqrt{19}\}$$

$$48. \left(\frac{3x-5}{x-1}\right)^4 + \left(\frac{x+1}{x-1}\right)^4 = 194$$

$$x = \pm\sqrt{3}$$