Bài 1. Giải các phương trình sau:

1. $9^{|3x-1|} = 3^{8x-2}$
2. $\left(3-2\sqrt{2}\right)^{2x} = 3+2\sqrt{2}$
3. $4^{x^2-3x+2} + 4^{x^2-6x-5} = 4^{2x^2+3x+7} + 1$
4. $5^{2x} - 7^x - 5^{2x}.35 + 7^x.35 = 0$
5. $2^{x^2-1} + 2^{x^2+2} = 3^{x^2} + 3^{x^2-1}$
6. $5^x - \sqrt{x^2+4} = 25$
7. $\left(\frac{1}{2}\right)^{x^2-2} = 2^{4-3x}$
8. $\left(\frac{1}{2}\right)^{x+7}.\left(\frac{1}{2}\right)^{1-2x} = 2$
9. $3^x.2^{x+1} = 72$
10. $5^{x+1} + 6.5^x 3.5^{x-1} = 52$
11. $16^{\frac{x+10}{x-10}} = 0,125.8^{\frac{x+5}{x-15}}$
12. $\left(\sqrt{5}+2\right)^{x-1} = \left(\sqrt{5}-2\right)^{\frac{x-1}{x+1}}$

Bài 2. Giải các phương trình sau:

1. $\left(\frac{2}{5}\right)^{4x+1} = \left(\frac{1}{7}\right)^{3x+2}$
2. $5^x.2^{\frac{2x-1}{x+1}} = 50$
3. $3^x.2^{\frac{3x}{x+2}} = 6$
4. $3^x.8^{\frac{x}{x+2}} = 6$
5. $4.9^{x-1} = 3\sqrt{2^{2x+1}}$
6. $2^{x^2-2x}.3^x = 1,5$
7. $5^x.3^{x^2} = 1$
8. $2^{3^x} = 3^{2^x}$
9. $3^x.2^{x^2} = 1$

Bài 3. Giải các phương trình sau:

1. $4^x + 2^{x+1} - 8 = 0$
2. $4^{x+1} - 6.2^{x+1} + 8 = 0$
3. $3^{4x+8} - 4.3^{2x+5} + 27 = 0$
4. $16^x - 17.4^x + 16 = 0$
5. $49^x + 7^{x+1} - 8 = 0$
6. $2^{x^2-x} - 2^{2+x-x^2} = 3.$
7. $\left(7+4\sqrt{3}\right)^x + \left(2+\sqrt{3}\right)^x = 6$
8. $4^{\cos 2x} + 4^{\cos^2 x} = 3$
9. $3^{2x+5} - 36.3^{x+1} + 9 = 0$
10. $3^{2x^2+2x+1} - 28.3^{x^2+x} + 9 = 0$
11. $4^{x^2+2} - 9.2^{x^2+2} + 8 = 0$
12. $3.5^{2x-1} - 2.5^{x-1} = 0,2$

Bài 4. Giải các phương trình sau:

1. $25^x - 2(3-x).5^x + 2x - 7 = 0$
2. $3.25^{x-2} + (3x-10).5^{x-2} + 3 - x = 0$
3. $3.4^x + (3x-10).2^x + 3 - x = 0$
4. $9^x + 2(x-2).3^x + 2x - 5 = 0$
5. $4x^2 + x.3^{\sqrt{x}} + 3^{1+\sqrt{x}} = 2.3^{\sqrt{x}}.x^2 + 2x + 6$
6. $3.25^{x-2} + (3x-10).5^{x-2} + 3 - x = 0$
7. $4^x + (x-8).2^x + 12 - 2x = 0$
8. $(x+4).9^x - (x+5).3^x + 1 = 0$
9. $4^{x^2} + (x^2-7).2^{x^2} + 12 - 4x^2 = 0$
10. $9^{-x} - (x+2).3^{-x} - 2(x+4) = 0$

Bài 5. Giải các phương trình sau:

1. $64.9^x - 84.12^x + 27.16^x = 0$
2. $3.16^x + 2.81^x = 5.36^x$
3. $6.3^{2x} - 13.6^x + 6.2^{2x} = 0$
4. $25^x + 10^x = 2^{2x+1}$

5. $27^x + 12^x = 2.8^x$
6. $3.16^x + 2.81^x = 5.36^x$
7. $6.9^{\frac{1}{x}} - 13.6^{\frac{1}{x}} + 6.4^{\frac{1}{x}} = 0$
8. $4^{-\frac{1}{x}} + 6^{-\frac{1}{x}} = 9^{-\frac{1}{x}}$
9. $2.4^{\frac{1}{x}} + 6^{\frac{1}{x}} = 9^{\frac{1}{x}}$
10. $\left(7+5\sqrt{2}\right)^x + \left(\sqrt{2}-5\right)\left(3+2\sqrt{2}\right)^x + 3\left(1+\sqrt{2}\right)^x + 1 - \sqrt{2} = 0.$

Bài 6. Giải các phương trình sau:

1. $\left(2-\sqrt{3}\right)^x + \left(2+\sqrt{3}\right)^x = 14$
2. $\left(\sqrt{2+\sqrt{3}}\right)^x + \left(\sqrt{2-\sqrt{3}}\right)^x = 4$
3. $(2+\sqrt{3})^x + (7+4\sqrt{3})(2-\sqrt{3})^x = 4(2+\sqrt{3})$
4. $\left(5-\sqrt{21}\right)^x + 7\left(5+\sqrt{21}\right)^x = 2^{x+3}$
5. $\left(5+\sqrt{24}\right)^x + \left(5-\sqrt{24}\right)^x = 10$
6. $\left(\frac{7+3\sqrt{5}}{2}\right)^x + 7\left(\frac{7-3\sqrt{5}}{2}\right)^x = 8$
7. $\left(\sqrt{6-\sqrt{35}}\right)^x + \left(\sqrt{6+\sqrt{35}}\right)^x = 12$
8. $\left(2+\sqrt{3}\right)^{(x-1)^2} + \left(2-\sqrt{3}\right)^{x^2-2x-1} = \frac{4}{2-\sqrt{3}}$
9. $\left(3+\sqrt{5}\right)^x + 16\left(3-\sqrt{5}\right)^x = 2^{x+3}$
10. $\left(3+\sqrt{5}\right)^x + \left(3-\sqrt{5}\right)^x - 7.2^x = 0$
11. $\left(7+4\sqrt{3}\right)^x - 3\left(2-\sqrt{3}\right)^x + 2 = 0$
12. $\left(\sqrt[3]{3+\sqrt{8}}\right)^x + \left(\sqrt[3]{3-\sqrt{8}}\right)^x = 6.$

Bài 7. Giải các phương trình sau:

1. $\left(2-\sqrt{3}\right)^x + \left(2+\sqrt{3}\right)^x = 4^x$
2. $\left(\sqrt{3}-\sqrt{2}\right)^x + \left(\sqrt{3}+\sqrt{2}\right)^x = \left(\sqrt{5}\right)^x$
3. $\left(3+2\sqrt{2}\right)^x + \left(3-2\sqrt{2}\right)^x = 6^x$
4. $\left(3+\sqrt{5}\right)^x + 16.\left(3-\sqrt{5}\right)^x = 2^{x+3}$
5. $\left(\frac{3}{5}\right)^x + \frac{7}{5} = 2^x$
6. $\left(\sqrt{2+\sqrt{3}}\right)^x + \left(\sqrt{2-\sqrt{3}}\right)^x = 2^x$
7. $2^x + 3^x + 5^x = 10^x$
8. $2^x + 3^x = 5^x$
9. $2^{x-1} - 2^{x^2-x} = (x-1)^2$
10. $3^x = 5 - 2x$
11. $2^x = 3 - x$
12. $2^{x+1} - 4^x = x - 1$
13. $2^x = 3^{\frac{x}{2}} + 1$
14. $4^x + 7^x = 9x + 2$
15. $5^{2x+1} - 5^{3x} - x + 1 = 0$
16. $3^x + 8^x = 4^x + 7^x$
17. $6^x + 2^x = 5^x + 3^x$
18. $9^x + 15^x = 10^x + 14^x$

Bài 8. Giải các phương trình sau:

1. $8.3^x + 3.2^x = 24 + 6^x$
2. $12.3^x + 3.15^x - 5^{x+1} = 20$
3. $8 - x.2^x + 2^{3-x} - x = 0$
4. $2^x + 3^x = 1 + 6^x$
5. $4^{x^2-3x+2} + 4^{x^2+6x+5} = 4^{2.x^2+3x+7} + 1$
6. $4^{x^2+x} + 2^{1-x^2} = 2^{(x+1)^2} + 1$
7. $x^2.3^x + 3^x(12-7x) = -x^3 + 8x^2 - 19x + 12$
8. $x^2.3^{x-1} + x(3^x - 2^x) = 2(2^x - 3^{x-1})$
9. $4^{\sin x} - 2^{1+\sin x}\cos(xy) + 2^{|y|} = 0$
10. $2^{2(x^2+x)} + 2^{1-x^2} - 2^{2(x^2+x)}.2^{1-x^2} - 1 = 0$

Bài 9. Giải các phương trình sau:

1. $\log_2[x(x-1)]=1$
2. $\log_2 x+\log_2(x-1)=1$
3. $\log_2(x-2)-6.\log_{1/8}\sqrt{3x-5}=2$
4. $\log_2(x-3)+\log_2(x-1)=3$
5. $\log_4(x+3)-\log_4(x-1)=2-\log_4 8$
6. $\log(x-2)+\log(x-3)=1-\log 5$
7. $2\log_8(x-2)-\log_8(x-3)=\dfrac{2}{3}$
8. $\log\sqrt{5x-4}+\log\sqrt{x+1}=2+\log 0,18$
9. $\log_3(x^2-6)=\log_3(x-2)+1$
10. $\log_2(x+3)+\log_2(x-1)=1/\log_5 2$
11. $\log_4 x+\log_4(10-x)=2$
12. $\log_5(x-1)-\log_{1/5}(x+2)=0$
13. $\log_2(x-1)+\log_2(x+3)=\log_2 10-1$ $\log_9(x+8)-\log_3(x+26)+2=0$

Bài 10. Giải các phương trình sau:

1. $\log_3 x+\log_{\sqrt{3}}x+\log_{1/3}x=6$
2. $1+\log(x^2-2x+1)-\log(x^2+1)=2\log(1-x)$
3. $\log_4 x+\log_{1/16}x+\log_8 x=5$
4. $2+\log(4x^2-4x+1)-\log(x^2+19)=2\log(1-2x)$
5. $\log_2 x+\log_4 x+\log_8 x=11$
6. $\log_{1/2}(x-1)+\log_{1/2}(x+1)=1+\log_{1/\sqrt{2}}(7-x)$
7. $\log_2\log_2 x=\log_3\log_3 x$
8. $\log_2\log_3 x=\log_3\log_2 x$
9. $\log_2\log_3 x+\log_3\log_2 x=\log_3\log_3 x$
10. $\log_2\log_3\log_4 x=\log_4\log_3\log_2 x$

Bài 11. Giải các phương trình sau:

1. $\log_2(9-2^x)=3-x$
2. $\log_3(3^x-8)=2-x$
3. $\log_7(6+7^{-x})=1+x$
4. $\log_3(4.3^{x-1}-1)=2x-1$
5. $\log_2(9-2^x)=5^{\log_5(3-x)}$
6. $\log_2(3.2^x-1)-2x-1=0$
7. $\log_2(12-2^x)=5-x$
8. $\log_5(26-3^x)=2$
9. $\log_2(5^{x+1}-25^x)=2$
10. $\log_4(3.2^{x+1}-5)=x$
11. $\log_{\frac{1}{\sqrt{6}}}(5^{x+1}-25^x)=-2$
12. $\log_{\frac{1}{\sqrt{5}}}(6^{x+1}-36^x)=-2$

Bài 12. Giải các phương trình sau:

1. $\log_{5-x}(x^2-2x+65)=2$
2. $\log_{x-1}(x^2-4x+5)=1$
3. $\log_x(5x^2-8x+3)=2$
4. $\log_{x+1}(2x^3+2x^2-3x+1)=3$
5. $\log_{x-3}(x-1)=2$
6. $\log_x(x+2)=2$
7. $\log_{2x}(x^2-5x+6)=2$
8. $\log_{x+3}(x^2-x)=1$
9. $\log_x(2x^2-7x+12)=2$
10. $\log_x(2x^2-3x-4)=2$
11. $\log_{2x}(x^2-5x+6)=2$
12. $\log_x(x^2-2)=1$
13. $\log_{3x+5}(9x^2+8x+2)=2$
14. $\log_{2x+4}(x^2+1)=1$

15. $\log_x \dfrac{15}{1-2x} = -2$
16. $\log_{x^2}(3-2x) = 1$
17. $\log_{x^2+3x}(x+3) = 1$
18. $\log_x(2x^2-5x+4) = 2$

Bài 13. Giải các phương trình sau:

1. $\log_3^2 x + \sqrt{\log_3^2 x + 1} - 5 = 0$
2. $\log_{\sqrt{2}}^2 x + 3\log_2 x + \log_{1/2} x = 2$
3. $\log_x 2 - \log_4 x + \dfrac{7}{6} = 0$
4. $\log_{\frac{1}{2}}^2 4x + \log_2 \dfrac{x^2}{8} = 8$
5. $\log_{\sqrt{2}}^2 x + 3\log_2 x + \log_{1/2} x = 0$
6. $\log_{x^2} 16 + \log_{2x} 64 = 3$
7. $\log_5 x - \log_x \dfrac{1}{5} = 2$
8. $\log_7 x - \log_x \dfrac{1}{7} = 2$
9. $2\log_5 \sqrt{x} - 2 = \log_x \dfrac{1}{5}$
10. $3\sqrt{\log_2 x} - \log_2 4x = 0$
11. $3\sqrt{\log_3 x} - \log_3 3x - 1 = 0$
12. $\log_2 \sqrt[3]{x} + \sqrt[3]{\log_2 x} = 4/3$
13. $\log_2 \sqrt[3]{x} - \sqrt[3]{\log_2 x} = -2/3$
14. $\log_2^2 x + 2\log_4 \dfrac{1}{x} = 0$
15. $\log_2^2(2-x) - 8\log_{1/4}(2-x) = 5$
16. $\log_5^2 x + 4\log_2 55x - 5 = 0$
17. $\log_x \sqrt{5} + \log_x 5x = \dfrac{9}{4} + \log_x^2 \sqrt{5}$
18. $\log_{x^2} 3 + \log_9 x = 1$
19. $\dfrac{1}{4-\log x} + \dfrac{2}{2+\log x} = 1$
20. $\dfrac{1}{5-\log x} + \dfrac{3}{3+\log x} = 1$
21. $\log_{2x} x^2 - 14\log_{16x} x^3 + 40\log_{4x} \sqrt{x} = 0$

Bài 14. Giải các phương trình sau:

1. $\log_3^2 x + (x-12)\log_3 x + 11 - x = 0$
2. $6.9^{\log_2 x} + 6.x^2 = 13.x^{\log_2 6}$
3. $x.\log_2^2 x - 2(x+1).\log_2 x + 4 = 0$
4. $\log_2^2 x + (x-1)\log_2 x = 6 - 2x$
5. $(x+2)\log^2{}_3(x+1) + 4(x+1)\log_3(x+1) - 16 = 0$
6. $\log_{x^2}(2+x) + \log_{\sqrt{2-x}} x = 2$
7. $\log_3^2(x+1) + (x-5)\log_3(x+1) - 2x + 6 = 0$
8. $4\sqrt{\log_3 x - 1} - \log_3 \sqrt{x} = 4$
9. $\log_2(x^2+3x+2) + \log_2(x^2+7x+12) = 3 + \log_2 3$

Bài 15. Giải các phương trình sau:

1. $x + x^{\log_2 3} = x^{\log_2 5} (x > 0)$
2. $x^2 + 3^{\log_2 x} = 5^{\log_2 x}$
3. $\log_5(x+3) = 3 - x$
4. $\log_2(3-x) = x$
5. $\log_2(x^2-x-6) + x = \log_2(x+2) + 4$
6. $x + 2.3^{\log_2 x} = 3$
7. $4(x-2)\left[\log_2(x-3) + \log_3(x-2)\right] = 15(x+1)$

Bài 16. Giải các phương trình sau:

1. $\log_2 x + 2.\log_7 x = 2 + \log_2 x.\log_7 x$
2. $\log_2 x.\log_3 x + 3 = 3.\log_3 x + \log_2 x$
3. $2(\log_9 x)^2 = \log_3 x.\log_3\left(\sqrt{2\,x+1} - 1\right)$

Bài 17. Giải các bất phương trình sau:

1. $16^{x-4} \geq 8$
2. $\left(\dfrac{1}{3}\right)^{2x+5} < 9$
3. $9^x \leq 3^{\frac{6}{x+2}}$

4. $4^{x^2-x+6} > 1$
5. $\left(\frac{1}{2}\right)^{4x^2-15x+4} < 2^{3x-4}$
6. $\left(\frac{1}{2}\right)^{4x^2-15x+13} < \left(\frac{1}{2}\right)^{4-3x}$
7. $5^{x^2-7x+12} \leq 1$
8. $2^{x-1} > \left(\frac{1}{16}\right)^{x}$
9. $2^{x+2}.5^{x+2} \leq 2^{3x}.5^{3x}$
10. $25^{x-1} \geq 125$
11. $2^{2x+6} + 2^{2x+7} > 17$
12. $\left(2-\sqrt{3}\right)^{x-1} \geq \left(2+\sqrt{3}\right)^{-x^2+3}$
13. $5^{2x-3} - 2.5^{x-2} \leq 3$
14. $4^{\frac{1}{x}-1} > 2^{\frac{1}{x}-2} + 3$
15. $5.4^{x} + 2.25^{x} \leq 7.10^{x}$
16. $16^{\frac{x+10}{x-10}} \leq 0,125.8^{\frac{x+5}{x-15}}$
17. $3^{2x+8} - 4.3^{x+5} + 27 \leq 0$
18. $6.9^{x} - 13.6^{x} + 6.4^{x} \geq 0$
19. $\left(\sqrt{2-\sqrt{3}}\right)^{x} + \left(\sqrt{2+\sqrt{3}}\right)^{x} < 4$
20. $2^{x^2-6x-\frac{5}{2}} > 16\sqrt{2}$
21. $2.2^{2x} - 9.14^{x} + 7.7^{2x} \geq 0$

Bài 18. Giải các phương trình sau:

1. $\log_{\frac{1}{3}} \frac{3x-1}{x+2} > 1$
2. $\log_4 (x+7) > \log_4 (1-x)$
3. $\log_2 (x+5) \leq \log_2 (3-2x) - 4$
4. $\log_2 \left(x^2-4x-5\right) < 4$
5. $\log_5 (26-3^x) > 2$
6. $\log_3 (13-4^x) > 2$
7. $\log_3 x + \log_9 x + \log_{27} x > 11$
8. $\frac{1}{1-\log x} + \frac{1}{\log x} > 1$
9. $\log_x 2.\log_{\frac{x}{16}} 2 > \frac{1}{\log_2 x - 6}$
10. $\log_4 (3^x-1).\log_{1/4}\left(\frac{3^x-1}{16}\right) \leq \frac{3}{4}$
11. $2(\log_3 x)^2 - 5\log_3 (9x) + 3 < 0$
12. $\log_{\sqrt{3}}\sqrt{x} + \log_{\frac{1}{3}} x^3 + \log_3 \left(3x^4\right) > 3$
13. $\log_2 (x+3) > 1 + \log_2 (x-1)$
14. $2\log_8 (x-2) + \log_{\frac{1}{8}} (x-3) = \frac{2}{3}$
15. $\log_3 \left(\log_{\frac{1}{2}} x\right) \leq 0$
16. $\log_5 (4^x+144) - 4\log_5 2 > 1 + \log_5 \left(2^{x-2}+1\right)$
17. $\log_{\frac{1}{3}}[\log_4 \left(x^2-5\right)] > 0$
18. $\log_{\frac{1}{5}} \left(x^2-6x+8\right) + 2\log_5 (x-4) > 0$
19. $\log_5 x + \log_{25} x > \log_{0,2}\sqrt{3}$
20. $7^x + 2.7^{1-x} - 9 > 0$
21. $2^{2x+6} + 2^{x+7} - 17 \geq 0$
22. $\log_8 \left(x^2-4x+3\right) \leq 1$
23. $2.16^{x} - 15.4^{x} - 8 < 0$
24. $\log_2 (4.3^x-6) - \log_2 (9^x-6) \leq 1$
25. $\log_5 x > \log_5 (x+6) - \log_5 (x+2)$
26. $\log \left(x^2+2x-3\right) + \log \frac{x+3}{x-1} > 0$