Задача 1. Виконати обчислення числового виразу. Результати подати у вигляді звичайного дробу, десяткового дробу, та у двійковій системі числення

1. $\left(8\frac{5}{12}-5\frac{19}{36}\right)\cdot 4{,}5-5\frac{2}{3}:0{,}85$
2. $0{,}0625:\left(\frac{1}{8}+\frac{5}{16}\right)\cdot 2{,}8$
3. $7{,}2375:2{,}5-\frac{1}{4}\cdot\left(\frac{1}{25}+2{,}26\right)$
4. $2\frac{1}{4}\cdot 1\frac{1}{9}+(3{,}25+5{,}5)\cdot\left(0{,}2-\frac{1}{70}\right)$
5. $\left(\frac{2}{7{,}5-6}-\frac{1}{9{,}5-7}\right):\frac{14}{15}$
6. $\left(2\frac{11}{15}+1{,}6+1\frac{7}{12}+\frac{1}{3}\right)\cdot\left(3\frac{5}{14}-2\frac{19}{30}\right):1\frac{3}{7}$
7. $\frac{\left(2{,}5-\frac{7{,}5}{5}\right)\cdot 0{,}5}{(2-1{,}8):0{,}4}+\frac{\left(6\frac{3}{5}-3\frac{3}{14}\right)\cdot 5\frac{5}{6}}{(21-1{,}25):2{,}5}$
8. $1\frac{7}{20}:2{,}7+2{,}7:1{,}35+\left(0{,}4:2\frac{1}{2}\right)\cdot\left(4{,}2-1\frac{3}{40}\right)$
9. $\left(\frac{0{,}012}{5}+\frac{0{,}04104}{5{,}4}\right)\cdot 4560-42\frac{1}{3}$
10. $\frac{(1{,}09-0{,}29)\cdot 1\frac{1}{4}}{\left(18{,}9-16\frac{13}{20}\right)\cdot\frac{8}{9}}+\frac{(11{,}81+8{,}19)\cdot 0{,}02}{9:11{,}25}$
11. $\frac{\left(2\frac{2}{3}-1\frac{5}{6}\right)\cdot 0{,}6}{0{,}4}+\frac{\left(178\frac{3}{4}-169\frac{5}{8}\right)\cdot 0{,}4}{0{,}8}$
12. $\frac{21\frac{1}{4}-19\frac{7}{8}}{0{,}012:0{,}048}+\frac{115\frac{3}{16}-108\frac{1}{4}}{0{,}0004:0{,}008}$
13. $\left(3\frac{2}{3}+1\frac{3}{4}\right):\left(6\frac{7}{12}-2\frac{1}{4}\right)\cdot 0{,}8$
14. $\left(11{,}25-3\frac{5}{12}+4{,}3-7\frac{19}{30}\right):\left(7\frac{7}{12}-5\frac{5}{6}\right)$
15. $\left(3{,}04:\frac{1}{30}-16{,}03:\frac{7}{20}\right)\cdot\frac{1}{5}+0{,}072\cdot\frac{1}{3}$

16. $\left(2\frac{1}{4}+3\frac{2}{3}\right):\left(8,5-1\frac{2}{5}\right)\cdot 1,2$

17. $\left(12,75-6\frac{11}{12}+14,8-7\frac{2}{15}\right):\left(10\frac{2}{3}-3\frac{11}{12}\right)$

18. $\left(5,07:\frac{1}{20}-23,4:\frac{13}{50}\right)\cdot\frac{1}{4}+0,074\cdot\frac{1}{2}$

19. $\left(5\frac{3}{5}-1\frac{1}{3}\right):\left(7\frac{7}{12}-2\frac{1}{4}\right)\cdot 1,25$

20. $\left(9,5-3\frac{3}{5}+5,5-6\frac{13}{15}\right)\cdot\left(2\frac{5}{12}+1\frac{1}{3}\right)$

21. $\left(2,04:\frac{1}{70}-14,84:\frac{7}{60}\right)\cdot\frac{1}{6}-0,084\cdot\frac{1}{12}$

22. $\left(2\frac{4}{5}+2\frac{2}{3}\right):\left(10\frac{13}{30}-3,6\right)\cdot 1,25$

23. $\left(15,25-3\frac{5}{12}+2\frac{2}{9}-2,5\right):\left(6\frac{1}{15}-4\frac{1}{3}\right)$

24. $\left(3,09:\frac{1}{40}-32,3:\frac{17}{50}\right)\cdot\frac{1}{4}-0,069\cdot\frac{1}{3}$

Задача 2. Розкласти на множники вираз

1. $x^3+4x^2-3x-18$
2. x^3-3x-2
3. $x^3+6x^2+11x+6$
4. $x^4+x^3+6x^2+5x+5$
5. $x^5+x^4+x^3+x^2+x+1$
6. $x^6-x^4+2x^3+2x^2$
7. x^5+x+1
8. x^8+x^4+1
9. x^8+x^7+1
10. x^8+x+1
11. x^8+5x^4+9
12. $x^2-6x-16$
13. $-x^2-x+20$
14. $x^2-11x+28$
15. $2x^2-5x-3$

16. $-x^2+8x-15$
17. $3x^2+4x+1$
18. $10x^2-5x+6$
19. $5x^2+23x-10$
20. $-x^2-4x-3$
21. $7x^2-8x+1$
22. $-\frac{1}{6}x^2+\frac{3}{2}x-3$
23. $6x^2-5x-6$
24. $-0,3x^2-2,4x+6$

Задача 3. Спростити вираз

1. $\frac{3a+4b}{c}+\frac{c-2b}{c}$
2. $\frac{x}{x+y}+\frac{y}{x+y}$
3. $\frac{5}{x-y}+\frac{2}{y-x}$
4. $\frac{9x}{x-y}+\frac{9y}{y-x}$
5. $\frac{1}{5x-4y}+\frac{1}{4y-5x}$
6. $\frac{x-y}{2x-3y}-\frac{x-2y}{3y-2x}$
7. $\frac{x-81}{9x-81}-\frac{7x+9}{9x-x^2}$
8. $\frac{x^2+2xy}{x^3-8y^3}-\frac{4y^2}{8y^3-x^3}$
9. $\left(x-\frac{x^2-y^2}{x-y}\right)\left(y+\frac{x^2-y^2}{x+y}\right)$
10. $\frac{16y}{9x^2+4xy}-\frac{81x}{9xy+4y^2}$
11. $\frac{x-5}{x^2+5x}+\frac{x+5}{x^2-5x}-\frac{4x}{x^2-25}$

12. $\left(\frac{x}{8x+1}+1\right)\cdot\frac{1-64x^2}{81x^2-1}-\frac{8x}{1-9x}$

13. $\left(\frac{5}{3-x}-4x\right):\frac{4x^2-12x+5}{x^2-6x+9}$

14. $\left(4x+1-\frac{1}{1-4x}\right):\left(4x-\frac{16x^2}{4x-1}\right)$

15. $\frac{a-8}{a+8}-\frac{a^2+192}{a^2-64}$

16. $\frac{a^2-24}{a^2-9}-\frac{a-8}{a-3}$

17. $\left(2+3x+\frac{1}{2-3x}\right):\left(1+\frac{1}{4-9x^2}\right)$

18. $\left(9x^2+1+\frac{1}{9x^2-1}\right):\left(9x^2+\frac{81x^4}{1-9x^2}\right)$

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

20. $\left(\frac{a+1}{2a-2}+\frac{6}{2a^2-2}-\frac{a-3}{2a+2}\right):\frac{3a+2}{3}$

21. $\frac{4a^2-3a+5}{a^3-1}-\frac{1-2a}{a^2+a+1}+\frac{6}{1-a}$

22. $\frac{5x-2}{4-3x}-\frac{4+7x}{4+3x}+\frac{24-2x+9x^2}{9x^2-16}$

23. $\frac{2}{x-3}+\frac{3}{2x-6}-\frac{2x-6}{2x^2-12x+18}$

25. $\frac{2-a}{a^2+1-2a}-\frac{1-a+a^2}{1-a}\cdot\frac{a}{a^3+1}$

Задача 4. Спростити вираз

1. $\frac{\cos^2\alpha}{1-\cos^2\alpha}$
2. $(\sin\alpha+\cos\alpha)^2+(\sin\alpha-\cos\alpha)^2+19$
3. $23-18\sin^2 10\alpha-18\cos^2 10\alpha$
4. $\frac{1}{1+tg^2\alpha}+\frac{1}{1+ctg^2\alpha}$

5. $\dfrac{2\sin^2\alpha-1}{1-2\cos^2\alpha}$
6. $2\sin(\alpha+\beta)\sin(\alpha-\beta)+\cos 2\alpha$
7. $\dfrac{\operatorname{tg}14^\circ+\operatorname{tg}46^\circ}{1-\operatorname{tg}14^\circ\operatorname{tg}46^\circ}$
8. $\dfrac{1-\operatorname{tg}29^\circ\cdot\operatorname{tg}31^\circ}{\operatorname{tg}29^\circ+\operatorname{tg}31^\circ}$
9. $\dfrac{1+\operatorname{tg}83^\circ\cdot\operatorname{tg}53^\circ}{\operatorname{tg}83^\circ-\operatorname{tg}53^\circ}$
10. $\dfrac{\sin 77^\circ-\sin 13^\circ}{\sin 32^\circ}$
11. $\dfrac{(\sin\alpha+\cos\alpha)^2}{1+\sin 2\alpha}$
12. $(\sin\alpha+\cos\alpha)^2+(\sin\alpha-\cos\alpha)^2-6(\sin\alpha-\sin^2\alpha)$
13. $\dfrac{\operatorname{tg}2\alpha+\operatorname{tg}9\beta}{\operatorname{ctg}2\alpha+\operatorname{ctg}9\beta}$
14. $\dfrac{1+\operatorname{tg}^6\alpha}{\operatorname{tg}^3\alpha+\operatorname{ctg}^3\beta}$
15. $\dfrac{\cos\alpha\cdot\cos\beta-\cos(\alpha+\beta)}{\cos(\alpha-\beta)-\sin\alpha\cdot\sin\beta}$
16. $\dfrac{1-2\sin^2\alpha+\sin^4\alpha}{1-2\cos^2\alpha+\cos^6\alpha}$
17. $\dfrac{\cos\alpha}{1+\sin\alpha}+\dfrac{1+\sin\alpha}{\cos\alpha}$
18. $\dfrac{\cos\alpha}{1+\operatorname{tg}\alpha}+\dfrac{\sin\alpha}{1+\operatorname{ctg}\alpha}$
19. $\dfrac{\sin^3\alpha-\cos^3\alpha}{\sin\alpha-\cos\alpha}-\sin\alpha\cdot\cos\alpha-1$
20. $\dfrac{\cos^2\alpha-1}{\sin^2\alpha-1}+\operatorname{tg}\alpha\cdot\operatorname{ctg}\alpha$
21. $\dfrac{\sin^2\alpha-\operatorname{tg}^2\alpha}{\cos^2\alpha-\operatorname{ctg}^2\alpha}$
22. $\dfrac{(\sin\alpha+\cos\alpha)^2-1}{\operatorname{ctg}\alpha-\sin\alpha\cos\alpha}$

23. $\dfrac{\sin\alpha}{1-\cos\alpha}-\dfrac{1+\cos\alpha}{\sin\alpha}$

24. $\dfrac{\cos^3(-\alpha)+\sin^3(-\alpha)}{\cos\alpha+\sin(-\alpha)}$

Задача 5. Спростити складний радикал

1. $\sqrt{11-4\sqrt{7}}+\sqrt{16-6\sqrt{7}}+\sqrt{99-70\sqrt{2}}$
2. $\sqrt{89-28\sqrt{10}}-\sqrt{190-60\sqrt{10}}+\sqrt{17-6\sqrt{8}}$
3. $\sqrt{6+2\sqrt{5}}+\sqrt{21-8\sqrt{5}}+\sqrt{8-6\sqrt{5}}$
4. $\sqrt{25-8\sqrt{3}}+\sqrt{58+14\sqrt{3}}-\sqrt{37+20\sqrt{3}}$
5. $\sqrt{10+4\sqrt{6}}+\sqrt{15-6\sqrt{6}}-\sqrt{24-4\sqrt{6}}$
6. $\sqrt{17-4\sqrt{6}}+\sqrt{77+30\sqrt{6}}-\sqrt{14+4\sqrt{6}}$
7. $\sqrt{11+4\sqrt{7}}+\sqrt{37-12\sqrt{7}}-\sqrt{64+6\sqrt{7}}$
8. $\sqrt{33-4\sqrt{35}}+\sqrt{21+4\sqrt{5}}+\sqrt{32-10\sqrt{7}}$
9. $\sqrt{8+2\sqrt{15}}+\sqrt{37-12\sqrt{15}}+\sqrt{83-8\sqrt{15}}$
10. $\sqrt{17-12\sqrt{2}}+\sqrt{33+20\sqrt{2}}-\sqrt{67-42\sqrt{2}}$
11. $\sqrt{28+6\sqrt{20}}-\sqrt{90-20\sqrt{20}}+\sqrt{12+2\sqrt{20}}$
12. $\sqrt{61+14\sqrt{6}}+\sqrt{35-8\sqrt{6}}-\sqrt{53+20\sqrt{6}}$
13. $\sqrt{33-4\sqrt{35}}-\sqrt{12+2\sqrt{35}}+\sqrt{83-12\sqrt{35}}$
14. $\sqrt{83+20\sqrt{6}}-\sqrt{206-84\sqrt{6}}+\sqrt{101-14\sqrt{6}}$
15. $\sqrt{11+4\sqrt{6}}-\sqrt{29-6\sqrt{6}}+\sqrt{98-40\sqrt{6}}$
16. $\sqrt{9-4\sqrt{5}}-\sqrt{46+6\sqrt{5}}+\sqrt{89-24\sqrt{5}}$
17. $\sqrt{19+8\sqrt{3}}-\sqrt{31-12\sqrt{3}}+\sqrt{73+40\sqrt{3}}$
18. $\sqrt{12+2\sqrt{11}}-\sqrt{103-12\sqrt{11}}+\sqrt{36+10\sqrt{11}}$
19. $\sqrt{17+4\sqrt{13}}-\sqrt{22+6\sqrt{13}}-\sqrt{53-4\sqrt{13}}$
20. $\sqrt{21+4\sqrt{17}}-\sqrt{26-6\sqrt{17}}+\sqrt{69-4\sqrt{17}}$
21. $\sqrt{28+6\sqrt{20}}-\sqrt{90-20\sqrt{20}}+\sqrt{12+2\sqrt{20}}$
22. $\sqrt{25-8\sqrt{3}}+\sqrt{58+14\sqrt{3}}-\sqrt{37+20\sqrt{3}}$
23. $\sqrt{10+4\sqrt{6}}+\sqrt{15-6\sqrt{6}}-\sqrt{24-4\sqrt{6}}$
24. $\sqrt{10+4\sqrt{6}}+\sqrt{15-6\sqrt{6}}-\sqrt{24-4\sqrt{6}}$