

27. $-xy''' + 2y'' = \frac{2}{x^2}$.
 28. $\operatorname{cth} x \cdot y'' + y' = \operatorname{ch} x$.
 29. $x^4 y'' + x^3 y' = 4$.
 30. $y'' + \frac{2x}{x^2+1} y' = 2x$.
 31. $(1+x^2)y'' + 2xy' = 12x^3$.

Задача 11. Найти решение задачи Коши.

1. $4y^3 y'' = y^4 - 1$, $y(0) = \sqrt{2}$, $y'(0) = 1/(2\sqrt{2})$.
2. $y'' = 128y^3$, $y(0) = 1$, $y'(0) = 8$.
3. $y'' y^3 + 64 = 0$, $y(0) = 4$, $y'(0) = 2$.
4. $y'' + 2 \sin y \cos^3 y = 0$, $y(0) = 0$, $y'(0) = 1$.
5. $y'' = 32 \sin^3 y \cos y$, $y(1) = \pi/2$, $y'(1) = 4$.
6. $y'' = 98y^3$, $y(1) = 1$, $y'(1) = 7$.
7. $y'' y^3 + 49 = 0$, $y(3) = -7$, $y'(3) = -1$.
8. $4y^3 y'' = 16y^4 - 1$, $y(0) = \frac{\sqrt{2}}{2}$, $y'(0) = \frac{1}{\sqrt{2}}$.
9. $y'' + 8 \sin y \cos^3 y = 0$, $y(0) = 0$, $y'(0) = 2$.
10. $y'' = 72y^3$, $y(2) = 1$, $y'(2) = 6$.
11. $y'' y^3 + 36 = 0$, $y(0) = 3$, $y'(0) = 2$.
12. $y'' = 18 \sin^3 y \cos y$, $y(1) = \pi/2$, $y'(1) = 3$.
13. $4y^3 y'' = y^4 - 16$, $y(0) = 2\sqrt{2}$, $y'(0) = \frac{1}{\sqrt{2}}$.
14. $y'' = 50y^3$, $y(3) = 1$, $y'(3) = 5$.
15. $y'' y^3 + 25 = 0$, $y(2) = -5$, $y'(2) = -1$.
16. $y'' + 18 \sin y \cos^3 y = 0$, $y(0) = 0$, $y'(0) = 3$.
17. $y'' = 8 \sin^3 y \cos y$, $y(1) = \pi/2$, $y'(1) = 2$.
18. $y'' = 32y^3$, $y(4) = 1$, $y'(4) = 4$.
19. $y'' y^3 + 16 = 0$, $y(1) = 2$, $y'(1) = 2$.
20. $y'' + 32 \sin y \cos^3 y = 0$, $y(0) = 0$, $y'(0) = 4$.
21. $y'' + 50 \sin^3 y \cos y$, $y(1) = \pi/2$, $y'(1) = 5$.
22. $y'' = 18y^3$, $y(1) = 1$, $y'(1) = 3$.
23. $y'' y^3 + 9 = 0$, $y(1) = 1$, $y'(1) = 3$.
24. $y^3 y'' = 4(y^4 - 1)$, $y(0) = \sqrt{2}$, $y'(0) = \sqrt{2}$.
25. $y'' + 50 \sin y \cos^3 y = 0$, $y(0) = 0$, $y'(0) = 5$.
26. $y'' = 8y^3$, $y(0) = 1$, $y'(0) = 2$.
27. $y'' y^3 + 4 = 0$, $y(0) = -1$, $y'(0) = -2$.
28. $y'' = 2 \sin^3 y \cos y$, $y(1) = \pi/2$, $y'(1) = 1$.
29. $y^3 y'' = y^4 - 16$, $y(0) = 2\sqrt{2}$, $y'(0) = \sqrt{2}$.
30. $y'' = 2y^3$, $y(-1) = 1$, $y'(-1) = 1$.
31. $y'' y^3 + 1 = 0$, $y(1) = -1$, $y'(1) = -1$.

Задача 12. Найти общее решение дифференциального уравнения.

1. $y''' + 3y'' + 2y' = 1 - x^2$.
2. $y''' - y'' = 6x^2 + 3x$.
3. $y''' - y' = x^2 + x$.
4. $y^{IV} - 3y''' + 3y'' - y' = 2x$.
5. $y^{IV} - y''' = 5(x+2)^2$.
6. $y^{IV} - 2y''' + y'' = 2x(1-x)$.
7. $y^{IV} + 2y''' + y'' = x^2 + x - 1$.
8. $y^V - y^{IV} = 2x + 3$.
9. $3y^{IV} + y''' = 6x - 1$.
10. $y^{IV} + 2y''' + y'' = 4x^2$.
11. $y''' + y'' = 5x^2 - 1$.
12. $y^{IV} + 4y''' + 4y'' = x - x^2$.
13. $7y''' - y'' = 12x$.
14. $y''' + 3y'' + 2y' = 3x^2 + 2x$.
15. $y''' - y' = 3x^2 - 2x + 1$.
16. $y''' - y'' = 4x^2 - 3x + 2$.
17. $y^{IV} - 3y''' + 3y'' - y' = x - 3$.
18. $y^{IV} + 2y''' + y'' = 12x^2 - 6x$.
19. $y''' - 4y'' = 32 - 384x^2$.
20. $y^{IV} + 2y''' + y'' = 2 - 3x^2$.
21. $y''' + y'' = 49 - 24x^2$.
22. $y''' - 2y'' = 3x^2 + x - 4$.
23. $y''' - 13y'' + 12y' = x - 1$.
24. $y^{IV} + y''' = x$.
25. $y''' - y'' = 6x + 5$.
26. $y''' + 3y'' + 2y' = x^2 + 2x + 3$.
27. $y''' - 5y'' + 6y' = (x-1)^2$.
28. $y^{IV} - 6y''' + 9y'' = 3x - 1$.
29. $y''' - 13y'' + 12y' = 18x^2 - 39$.
30. $y^{IV} + y''' = 12x + 6$.
31. $y''' - 5y'' + 6y' = 6x^2 + 2x - 5$.

Задача 13. Найти общее решение дифференциального уравнения.

1. $y''' - 4y'' + 5y' - 2y = (16 - 12x)e^{-x}$.
2. $y''' - 3y'' + 2y' = (1 - 2x)e^x$.

3. $y''' - y'' - y' + y = (3x + 7)e^{2x}$.
4. $y''' - 2y'' + y' = (2x + 5)e^{2x}$.
5. $y''' - 3y'' + 4y = (18x - 21)e^{-x}$.
6. $y''' - 5y'' + 8y' - 4y = (2x - 5)e^x$.
7. $y''' - 4y'' + 4y' = (x - 1)e^x$.
8. $y''' + 2y'' + y' = (18x + 21)e^{2x}$.
9. $y''' + y'' - y' - y = (8x + 4)e^x$.
10. $y''' - 3y'' - 2y = -4xe^x$.
11. $y''' - 3y'' + 2y = (4x + 9)e^{2x}$.
12. $y''' + 4y'' + 5y' + 2y = (12x + 16)e^x$.
13. $y''' - y'' - 2y' = (6x - 11)e^{-x}$.
14. $y''' + y'' - 2y' = (6x + 5)e^x$.
15. $y''' + 4y'' + 4y' = (9x + 15)e^x$.
16. $y''' - 3y'' - y' + 3y = (4 - 8x)e^x$.
17. $y''' - y'' - 4y' + 4y = (7 - 6x)e^x$.
18. $y''' + 3y'' + 2y' = (1 - 2x)e^{-x}$.
19. $y''' - 5y'' + 7y' - 3y = (20 - 16x)e^{-x}$.
20. $y''' - 4y'' + 3y' = -4xe^x$.
21. $y''' - 5y'' + 3y' + 9y = e^{-x}(32x - 32)$.
22. $y''' - 6y'' + 9y' = 4xe^x$.
23. $y''' - 7y'' + 15y' - 9y = (8x - 12)e^x$.
24. $y''' - y'' - 5y' - 3y = -(8x + 4)e^x$.
25. $y''' + 5y'' + 7y' + 3y = (16x + 20)e^x$.
26. $y''' - 2y'' - 3y' = (8x - 14)e^{-x}$.
27. $y''' + 2y'' - 3y' = (8x + 6)e^x$.
28. $y''' + 6y'' + 9y' = (16x + 24)e^x$.
29. $y''' - y'' - 9y' + 9y = (12 - 16x)e^x$.
30. $y''' + 4y'' + 3y' = 4(1 - x)e^{-x}$.
31. $y''' + y'' - 6y' = (20x + 14)e^{2x}$.

Задача 14. Найти общее решение дифференциального уравнения.

1. $y'' + 2y' = 4e^x(\sin x + \cos x)$.
2. $y'' - 4y' + 4y = -e^{2x} \sin 6x$.
3. $y'' + 2y' = -2e^x(\sin x + \cos x)$.
4. $y'' + y = 2 \cos 7x + 3 \sin 7x$.
5. $y'' + 2y' + 5y = -\sin 2x$.
6. $y'' - 4y' + 8y = e^x(5 \sin x - 3 \cos x)$.

7. $y'' + 2y' = e^x(\sin x + \cos x)$.
8. $y'' - 4y' + 4y = e^{2x} \sin 3x$.
9. $y'' + 6y' + 13y = e^{-3x} \cos 4x$.
10. $y'' + y = 2 \cos 3x - 3 \sin 3x$.
11. $y'' + 2y' + 5y = -2 \sin x$.
12. $y'' - 4y' + 8y = e^x(-3 \sin x + 4 \cos x)$.
13. $y'' + 2y' = 10e^x(\sin x + \cos x)$.
14. $y'' - 4y' + 4y = e^{2x} \sin 5x$.
15. $y'' + y = 2 \cos 5x + 3 \sin 5x$.
16. $y'' + 2y' + 5y = -17 \sin 2x$.
17. $y'' + 6y' + 13y = e^{-3x} \cos x$.
18. $y'' - 4y' + 8y = e^x(3 \sin x + 5 \cos x)$.
19. $y'' + 2y' = 6e^x(\sin x + \cos x)$.
20. $y'' - 4y' + 4y = -e^{2x} \sin 4x$.
21. $y'' + 6y' + 13y = e^{-3x} \cos 5x$.
22. $y'' + y = 2 \cos 7x - 3 \sin 7x$.
23. $y'' + 2y' + 5y = -\cos x$.
24. $y'' - 4y' + 8y = e^x(2 \sin x - \cos x)$.
25. $y'' + 2y' = 3e^x(\sin x + \cos x)$.
26. $y'' - 4y' + 4y = e^{2x} \sin 4x$.
27. $y'' + 6y' + 13y = e^{-3x} \cos 8x$.
28. $y'' + 2y' + 5y = 10 \cos x$.
29. $y'' + y = 2 \cos 4x + 3 \sin 4x$.
30. $y'' - 4y' + 8y = e^x(-\sin x + 2 \cos x)$.
31. $y'' - 4y' + 4y = e^{2x} \sin 6x$.

Задача 15. Найти общее решение дифференциального уравнения.

1. $y'' = 2y' = 2 \operatorname{ch} 2x$.
2. $y'' + y = 2 \sin x - 6 \cos x + 2e^x$.
3. $y''' - y' = 2e^x + \cos x$.
4. $y'' - 3y' = 2 \operatorname{ch} 3x$.
5. $y'' + 4y = -8 \sin 2x + 32 \cos 2x + 4e^{2x}$.
6. $y''' - y' = 10 \sin x + 6 \cos x + 4e^x$.
7. $y'' - 4y' = 16 \operatorname{ch} 4x$.
8. $y'' + 9y = -18 \sin 3x - 18e^{3x}$.
9. $y''' - 4y' = 24e^{2x} - 4 \cos 2x + 8 \sin 2x$.
10. $y'' - 5y' = 50 \operatorname{ch} 5x$.

11. $y'' + 16y = 16 \cos 4x - 16e^{4x}$.
12. $y''' - 9y' = -9e^{3x} + 18 \sin 3x - 9 \cos 3x$.
13. $y'' - y' = 2 \operatorname{ch} x$.
14. $y'' + 25y = 20 \cos 5x - 10 \sin 5x + 50e^{5x}$.
15. $y''' - 16y' = 48e^{4x} + 64 \cos 4x - 64 \sin 4x$.
16. $y'' + 2y' = 2 \operatorname{sh} 2x$.
17. $y'' + 36y = 24 \sin 6x - 12 \cos 6x + 36e^{6x}$.
18. $y''' - 25y' = 25(\sin 5x + \cos 5x) - 50e^{5x}$.
19. $y'' + 3y' = 2 \operatorname{sh} 3x$.
20. $y'' + 49y = 14 \sin 7x + 7 \cos 7x - 98e^{7x}$.
21. $y''' - 36y' = 36e^{6x} - 72(\cos 6x + \sin 6x)$.
22. $y'' + 4y' = 16 \operatorname{sh} 4x$.
23. $y'' + 64y = 16 \sin 8x - 16 \cos 8x - 64e^{8x}$.
24. $y''' - 49y' = 14e^{7x} - 49(\cos 7x + \sin 7x)$.
25. $y'' + 5y' = 50 \operatorname{sh} 5x$.
26. $y'' + 81y = 9 \sin 9x + 3 \cos 9x + 162e^{9x}$.
27. $y''' - 64y' = 128 \cos 8x - 64e^{8x}$.
28. $y'' + y' = 2 \operatorname{sh} x$.
29. $y'' + 100y = 20 \sin 10x - 30 \cos 10x - 200e^{10x}$.
30. $y''' - 81y' = 162 \cdot e^{9x} + 81 \sin 9x$.
31. $y''' - 100y' = 20e^{10x} + 100 \cos 10x$.

Задача 16. Найдите решение задачи Коши.

1. $y'' + \pi^2 y = \frac{\pi^2}{\cos \pi x}, y(0) = 3, y'(0) = 0$.
2. $y'' + 3y' = \frac{9e^{3x}}{1+e^{3x}}, y(0) = \ln 4, y'(0) = 3(1 - \ln 2)$.
3. $y'' + 4y = 8 \operatorname{ctg} 2x, y(\frac{\pi}{4}) = 5, y'(\frac{\pi}{4}) = 4$.
4. $y'' - 6y' + 8y = \frac{4}{1+e^{-2x}}, y(0) = 1 + 2 \ln 2, y'(0) = 6 \ln 2$.
5. $y'' - 9y' + 18y = \frac{9e^{3x}}{1+e^{-3x}}, y(0) = 0, y'(0) = 0$.
6. $y'' + \pi^2 y = \frac{\pi^2}{\sin \pi x}, y(\frac{1}{2}) = 1, y'(\frac{1}{2}) = \frac{\pi^2}{2}$.
7. $y'' + \frac{1}{\pi^2} y = \frac{1}{\pi^2 \cos(x/\pi)}, y(0) = 2, y'(0) = 0$.
8. $y'' - 3y' = \frac{9e^{-3x}}{3+e^{-3x}}, y(0) = 4 \ln 4, y'(0) = 3(3 \ln 4 - 1)$.
9. $y'' + y = 4 \operatorname{ctg} x, y(\pi/2) = 4, y'(\pi/2) = 4$.
10. $y'' - 6y' + 8y = \frac{4}{2+e^{-2x}}, y(0) = 1 + 3 \ln 3, y'(0) = 10 \ln 3$.
11. $y'' + 6y' + 8y = \frac{4e^{-2x}}{2+e^{2x}}, y(0) = 0, y'(0) = 0$.
12. $y'' + 9y = \frac{9}{\sin 3x}, y(\pi/6) = 4, y'(\pi/6) = 3\pi/2$.

13. $y'' + 9y = \frac{9}{\cos 3x}, y(0) = 1, y'(0) = 0$.
14. $y'' - y' = \frac{e^{-x}}{2+e^{-x}}, y(0) = \ln 27, y'(0) = \ln 9 - 1$.
15. $y'' + 4y = 4 \operatorname{ctg} 2x, y(\pi/4) = 3, y'(\pi/4) = 2$.
16. $y'' - 3y' + 2y = \frac{1}{3+e^{-x}}, y(0) = 1 + 8 \ln 2, y'(0) = 14 \ln 2$.
17. $y'' - 6y' + 8y = \frac{4e^{2x}}{1+e^{-2x}}, y(0) = 0, y'(0) = 0$.
18. $y'' + 16y = \frac{16}{\sin 4x}, y(\pi/8) = 3, y'(\pi/8) = 2\pi$.
19. $y'' + 16y = \frac{16}{\cos 4x}, y(0) = 3, y'(0) = 0$.
20. $y'' - 2y' = \frac{4e^{-2x}}{1+e^{-2x}}, y(0) = \ln 4, y'(0) = \ln 4 - 2$.
21. $y'' + \frac{y}{4} = \frac{1}{4} \operatorname{ctg}(\frac{x}{2}), y(\pi) = 2, y'(\pi) = \frac{1}{2}$.
22. $y'' - 3y' + 2y = \frac{1}{2+e^{-x}}, y(0) = 1 + 3 \ln 3, y'(0) = 5 \ln 3$.
23. $y'' + 3y' + 2y = \frac{e^{-x}}{2+e^x}, y(0) = 0, y'(0) = 0$.
24. $y'' + 4y = \frac{4}{\sin 2x}, y(\pi/4) = 2, y'(\pi/4) = \pi$.
25. $y'' + 4y = \frac{4}{\cos 2x}, y(0) = 2, y'(0) = 0$.
26. $y'' + y' = \frac{e^x}{2+e^x}, y(0) = \ln 27, y'(0) = 1 - \ln 9$.
27. $y'' + y = 2 \operatorname{ctg} x, y(\pi/2) = 1, y'(\pi/2) = 2$.
28. $y'' - 3y' + 2y = \frac{1}{1+e^{-x}}, y(0) = 1 + 2 \ln 2, y'(0) = 3 \ln 2$.
29. $y'' - 3y' + 2y = \frac{e^x}{1+e^{-x}}, y(0) = 0, y'(0) = 0$.
30. $y'' + y = \frac{1}{\sin x}, y(\pi/2) = 1, y'(\pi/2) = \pi/2$.
31. $y'' + y = \frac{1}{\cos x}, y(0) = 1, y'(0) = 0$.