

Задача 1

Проинтегрировать следующие линейные дифференциальные уравнения при заданных начальных условиях:

1. $x'' + 4x = e^t$; при $t = 0$; $x = x_0$; $x' = x'_0$
2. $x'' + 9x = \cos 3t$; при $t = 0$; $x = x_0$; $x' = x'_0$
3. $x'' - 4x = t$; при $t = 0$; $x = x_0$; $x' = x'_0$
4. $x'' - 9x = \operatorname{sh} 3t$; при $t = 0$; $x = x_0$; $x' = x'_0$
5. $x'' - 3x' = t$; при $t = 0$; $x = x_0$; $x' = x'_0$
6. $x'' - 4x' + 4x = e^{2t}$; при $t = 0$; $x = x_0$; $x' = x'_0$
7. $x'' - 4x' + 5x = e^t$; при $t = 0$; $x = x_0$; $x' = x'_0$
8. $x'' + 2x' + 2x = t^2$; при $t = 0$; $x = x_0$; $x' = x'_0$
9. $x'' + 2x' + x = e^{-t}$; при $t = 0$; $x = x_0$; $x' = x'_0$
10. $x'' + 4x' + 4x = e^{-2t}$; при $t = 0$; $x = x_0$; $x' = x'_0$
11. $x'' + x' = e^{-t}$; при $t = 0$; $x = x_0$; $x' = x'_0$
12. $x'' + 3x' + 2x = e^t$; при $t = 0$; $x = x_0$; $x' = x'_0$
13. $x'' + x' - 2x = e^t$; при $t = 0$; $x = x_0$; $x' = x'_0$
14. $x'' - x' - 2x = t$; при $t = 0$; $x = x_0$; $x' = x'_0$
15. $x'' - 2x' = e^{2t}$; при $t = 0$; $x = x_0$; $x' = x'_0$
16. $x'' + 2x = t$; при $t = 0$; $x = x_0$; $x' = x'_0$
17. $x'' + 2x' + x = e^{-t}$; при $t = 0$; $x_0 = 1$; $x'_0 = 0$
18. $x'' - 3x' = e^{3t}$; при $t = 0$; $x_0 = 0$; $x'_0 = -1$
19. $x'' - 2x' + 2x = \sin t$; при $t = 0$; $x_0 = 0$; $x'_0 = 1$
20. $x'' + 4x = \sin 2t$; при $t = 0$; $x_0 = 1$; $x'_0 = -2$
21. $x'' - 9x = \operatorname{sh} t$; при $t = 0$; $x_0 = -1$; $x'_0 = 3$
22. $x'' + x' = t^2$; при $t = 0$; $x_0 = 1$; $x'_0 = 0$
23. $x'' + x' - 2x = e^{-t}$; при $t = 0$; $x_0 = 1$; $x'_0 = -2$
24. $x'' - x' - 6x = e^{-t}$; при $t = 0$; $x_0 = 0$; $x'_0 = -1$
25. $x''' - x' = t$; при $t = 0$; $x_0 = 0$; $x'_0 = 1$; $x''_0 = 0$
26. $x''' - x' = e^t$; при $t = 0$; $x_0 = 1$; $x'_0 = 0$; $x''_0 = 0$
27. $x^{IV} - x = 1$; при $t = 0$; $x_0 = 1$; $x'_0 = x''_0 = x'''_0 = 0$
28. $x^{IV} - x'' = \operatorname{sh} t$; при $t = 0$; $x_0 = x'_0 = x''_0 = 0$; $x'''_0 = 1$
29. $x^{IV} - x''' = e^t$; при $t = 0$; $x_0 = x'_0 = x''_0 = 0$; $x'''_0 = 1$
30. $x''' - 2x'' + x' = 1$; при $t = 0$; $x_0 = x'_0 = x''_0 = 0$.

Задача 2

Проинтегрировать следующие системы линейных дифференциальных уравнений при заданных начальных условиях:

N вар.	Система	Начальные условия
1	$\begin{cases} x'' - y' = t \\ y'' - x' = 0 \end{cases}$	$t = 0; \quad x = -1; \quad x' = 0; \quad y = 1; \quad y' = 0$
2	$\begin{cases} x'' + y' = t \\ y'' - x' = 1 \end{cases}$	$t = 0; \quad x = 1; \quad x' = -1; \quad y = 1; \quad y' = 0$
3	$\begin{cases} x'' - y' = t \\ y'' + x' = 0 \end{cases}$	$t = 0; \quad x = -1; \quad x' = 2; \quad y = 1; \quad y' = 0$
4	$\begin{cases} x'' + y'' = 0 \\ x' + y = 1 + e^t \end{cases}$	$t = 0; \quad x = 0; \quad x' = 2; \quad y = 0; \quad y' = -1$
5	$\begin{cases} x'' + 2x' + y' = e^{-t} \\ y'' - x' = 0 \end{cases}$	$t = 0; \quad x = 0; \quad x' = 1; \quad y = -1; \quad y' = 0$
6	$\begin{cases} x'' - y = te^t \\ x'' - x' + y'' - y = e^t + 2t \end{cases}$	$t = 0; \quad x = 0; \quad x' = 1; \quad y = 0; \quad y' = 2$
7	$\begin{cases} x'' + y' = \operatorname{sh} t - \sin t - t \\ y'' + x' = \operatorname{ch} t - \cos t \end{cases}$	$t = 0; \quad x = 0; \quad x' = 2; \quad y = 1; \quad y' = 0$
8	$\begin{cases} x'' + x' - y' = 1 \\ x' + x - y'' = 1 + 4e^{-t} \end{cases}$	$t = 0; \quad x = 1; \quad x' = 0; \quad y = 0; \quad y' = 1$
9	$\begin{cases} x'' - y' + y = \cos t - t \\ y'' + x' = -2t \end{cases}$	$t = 0; \quad x = 0; \quad x' = 1; \quad y = 2; \quad y' = -1$
10	$\begin{cases} x'' - x' + y' = e^{-t} + \cos t \\ x' - y'' - y' = 2e^t + \sin t \end{cases}$	$t = 0; \quad x = 2; \quad x' = 1; \quad y = 0; \quad y' = 1$
11	$\begin{cases} x'' + x' + y = t \\ x' + x - y'' = 1 \end{cases}$	$t = 0; \quad x = 1; \quad x' = 1; \quad y = 1; \quad y' = 0$
12	$\begin{cases} x'' - x - 2y' = t \\ x'' - x' - y'' = 1 \end{cases}$	$t = 0; \quad x = 0; \quad x' = 0; \quad y = 2; \quad y' = 1$
13	$\begin{cases} x'' + x - 2y = 2 \cos t \\ x' - y'' = 0 \end{cases}$	$t = 0; \quad x = 1; \quad x' = 2; \quad y = 0; \quad y' = 1$
14	$\begin{cases} x'' + x + 2y' = 2 \\ x' + y'' = \cos t \end{cases}$	$t = 0; \quad x = 1; \quad x' = 0; \quad y = 1; \quad y' = 0$

Задача 2

Проинтегрировать следующие системы линейных дифференциальных уравнений при заданных начальных условиях:

N вар.	Система	Начальные условия
15	$\begin{cases} x'' - y' = 0 \\ x - y'' = 2 \sin t \end{cases}$	$t = 0; \quad x = -1; \quad x' = 1; \quad y = 1; \quad y' = 1$
16	$\begin{cases} x'' - y' = 0 \\ x' - y'' = 2 \cos t \end{cases}$	$t = 0; \quad x = 0; \quad x' = 2; \quad y = 2; \quad y' = 0$
17	$\begin{cases} x'' - x + y' = \cos t \\ x' + y'' + y = \operatorname{ch} t + t \end{cases}$	$t = 0; \quad x = 1; \quad x' = 1; \quad y = 0; \quad y' = 2$
18	$\begin{cases} x'' + y' = 0 \\ y'' + x' = 1 - 2 \sin t \end{cases}$	$t = 0; \quad x = 1; \quad x' = 1; \quad y = 1; \quad y' = 1$
19	$\begin{cases} x'' - x + y = 1 - \frac{t^2}{2} \\ x' + y'' = e^t \end{cases}$	$t = 0; \quad x = 1; \quad x' = 2; \quad y = 1; \quad y' = 1$
20	$\begin{cases} x'' - 2y = e^t \\ y'' + 2x = -3e^t \end{cases}$	$t = 0; \quad x = -1; \quad x' = 0; \quad y = 0; \quad y' = 0$
21	$\begin{cases} x'' + 2y = e^{-t} \\ x' + x - y'' + y = 0 \end{cases}$	$t = 0; \quad x = 0; \quad x' = 2; \quad y = 1; \quad y' = 0$
22	$\begin{cases} x'' - x + 2y - 2y'' = t \\ y'' - x' = te^{-t} \end{cases}$	$t = 0; \quad x = 0; \quad x' = 1; \quad y = 1; \quad y' = -\frac{1}{2}$
23	$\begin{cases} x'' - y' = e^t \\ y'' - y + x' = 0 \end{cases}$	$t = 0; \quad x = 1; \quad x' = 0; \quad y = -1; \quad y' = 0$
24	$\begin{cases} x'' - x' + y = \sin t \\ y'' + y - x' = e^t \end{cases}$	$t = 0; \quad x = -1; \quad x' = 0; \quad y = 1; \quad y' = 1$
25	$\begin{cases} x'' + y' + y = e^t - t \\ x' - x + 2y'' - y = -e^{-t} \end{cases}$	$t = 0; \quad x = 1; \quad x' = 2; \quad y = 0; \quad y' = 0$
26	$\begin{cases} x'' - y = \operatorname{sh} t - t \\ y'' + x' = \operatorname{ch} t - 1 \end{cases}$	$t = 0; \quad x = 1; \quad x' = -1; \quad y = 1; \quad y' = 0$
27	$\begin{cases} x'' + y' = \operatorname{sh} t \\ y'' - y + x' = 2t \end{cases}$	$t = 0; \quad x = 0; \quad x' = 0; \quad y = 1; \quad y' = -1$
28	$\begin{cases} x'' + 2y' = 0 \\ x' + y'' + 2y = -4e^{2t} \end{cases}$	$t = 0; \quad x = 1; \quad x' = 0; \quad y = 0; \quad y' = -2$
29	$\begin{cases} x'' + y' + x = e^t \\ y'' + x' = 1 \end{cases}$	$t = 0; \quad x = 1; \quad x' = 2; \quad y = 0; \quad y' = -1$
30	$\begin{cases} 2y' - x'' = 2 \\ y'' + 2y + x' = 2t + 1 \end{cases}$	$t = 0; \quad x = 1; \quad x' = 1; \quad y = 0; \quad y' = -1$