

Завдання для самостійної роботи

Зінтегрувати диференціальні рівняння або знайти розв'язки задач Коші:

1. $(1 - y^2)xdx - y(x^4 + 4)dy = 0$.
2. $y' = 10^{x+y}$.
3. $2x^2yy' + y^2 = 3$.
4. $(xy^2 + x)dx + (y - x^2y)dy = 0$.
5. $(y + 1)x + (x^4 + 16)(y - 3)y' = 0$.
6. $y^{-3} \ln(\ln x)dx + xe^{y^2} dy = 0$.
7. $\operatorname{tg} y \cdot y' = \frac{\sin(x + y) + \sin(x - y)}{\sin(x + y)}$.
8. $xyy' + \sqrt{1 + x^2 + y^2 + x^2y^2} = 0$.
9. $x + 2y + 1 = (2x + 4y + 3)y'$.
10. $y' = \sqrt[3]{x + y + 1}$.
11. $(3 - x - 2y)dx - 2(1 + x + 2y)dy = 0$.
12. $y' = \sin(x - y)$.
13. $y' = \sqrt{4x + 2y - 1}$.
14. $(y - 3x + 3)dx + (3x - y - 1)dy = 0$.
15. $y'\sqrt{x + y} = 1$.
16. $y' = \sin(x + y) + \cos(x + y)$.
17. $2xy^2dx + (x^2 - 1)(y^2 + 1)dy = 0$, $y(0) = 1$.
18. $x \sin y dx + (x^2 - 5) \cos y dy = 0$, $y(2) = \frac{\pi}{2}$.
19. $(x^3 + 1)ydx - x(y + 7)dy = 0$, $y(1) = 1$.
20. $x^2 \sin y + \sqrt[3]{x^3 + 1}y' = 0$, $y(0) = \frac{\pi}{2}$.
21. $xy' = y \ln \frac{y}{x}$.
22. $(y^2 - 2xy)dx + x^2dy = 0$, $y(1) = 2$.
23. $2x(y^2 + x^2)y' = y(y^2 + 2x^2)$.
24. $(x \operatorname{ctg} \frac{y}{x} - y) dx + xdy = 0$, $y(1) = \pi$.
25. $(x - y \cos \frac{y}{x}) dx + x \cos \frac{y}{x} dy = 0$.
26. $(2x + y)dx + ydy = 0$.
27. $(3x^2 - y^2)dx - 2xydy = 0$, $y(1) = \sqrt{3}$.
28. $x \sin \frac{y}{x} dy = (y \sin \frac{y}{x} - x) dx$.
29. $(2\sqrt{xy} - y)dx = xdy$.
30. $xy' - y = x \operatorname{tg} \frac{y}{x}$.
31. $y' = e^{-\frac{y}{x}} + \frac{y}{x}$, $y(1) = 0$.
32. $y' = \frac{y}{x} + \operatorname{tg} \frac{y}{x} \cos^2 \frac{y}{x}$.
33. $2x^3y' = y(2x^2 - y^2)$.
34. $(x^3 - 3x^2y)dx + (y^3 - x^3)dy = 0$.
35. $(y + \sqrt{x^2 + y^2})dx - xdy = 0$.
36. $y' + 2y = x^2 + 2x$.
37. $(1 - 2xy)y' = y(y - 1)$.
38. $y'(x^2 + 1) - xy = (x^2 - x + 1)e^x$.
39. $y' - \frac{2y}{\sin 2x} = -\frac{\sin^2 x}{\cos x}$.
40. $(y^2 - 6x)y' + 2y = 0$.
41. $y' + y \operatorname{tg} x = x \cos^2 x$.
42. $x^4y' + 2x^3y = 1$.
43. $y'x \ln x - y = x(\ln x - 1)$, $y(e) = 2e$.
44. $y' \sin x - y = 2 \sin^2 \frac{x}{2}$, $y(\frac{\pi}{2}) = \pi$.
45. $x^2y' + y = 4$, $y(-1) = 5$.
46. $(2x - 6y^4)dy + ydx = 0$, $y(3) = 1$.
47. $(2xy^2 - x - y^2)y' = y^3 - y$, $y(0) = 0$.
48. $\frac{dx}{x \ln x} = \frac{dy}{y + x^2 \ln^2 x}$, $y(1) = 1$.
49. $xy' + y = x \cos x$, $y(\frac{\pi}{2}) = 1$.
50. $(2x + y)dy = ydx + 4 \ln y dy$.
51. $y' - y \cos x = y^2 \cos x$.
52. $y' - 2xy = 2x^3y^2$.
53. $x dy = (y^2 \ln x - y) dx$.
54. $(x + 1)(y' + y^2) = -y$.
55. $y^3 dx + (x^3 \ln y - xy^2) dy = 0$.

56. $(y \cos x + 2xy^2)dx + (\sin x - \sin y + 2x^2y)dy = 0$.
57. $2xydx + (x^2 - y^2)dy = 0$.
58. $\frac{y}{x}dx + (y^3 + \ln x)dy = 0$.
59. $(2x \sin y - y^2 \sin x)dx + (x^2 \cos y + 2y \cos x + 1)dy = 0$.
60. $2 \left(\frac{1}{x^3y} + \frac{y \ln x}{x} \right) + \left(\frac{1}{x^2y^2} + \ln^2 x \right) = 0$.
61. $(x^3 + xy^2)dx + (x^2y + y^3)dy = 0$.
62. $\frac{2x}{y^3}dx + \frac{y^2 - 3x^2}{y^4}dy = 0$.
63. $(1 + e^{x/y})dx + e^{x/y}(1 - x/y)dy = 0$.
64. $\sin(x + y)dx + x \cos(x + y)(dx + dy) = 0$.
65. $2x \sin y - y \cos x + \ln x + (x^2 \cos y - \ln y - \sin x)y' = 0$.
66. $\left(2\sqrt{xy} \sin y^2 + \frac{x}{y^2} \right) dy = \left(\frac{1}{2\sqrt{x}} \cos y^2 + \frac{1}{y} + \frac{6}{x^4} \right) dx$.
67. $(x \ln y - x^2 + \cos y)dy + (x^3 + y \ln y - y - 2xy)dx = 0$.
68. $(y + 2 \sin x)dx + (x + 9 \cos y)dy = 0$
69. $\left(\frac{\sin 2x}{y} + x \right) dx + \left(\frac{\sin^2 x}{y^2} - y \right) dy = 0$.
70. $\frac{3x^2 + y^2}{y^2} dx = \frac{2x^3 + 5y}{y^3} dy$.
71. $xy'^2 = y(2y' - 1)$.
72. $xy'^2 - 2yy' + x = 0$.
73. $(xy' + 3y)^2 = 7x$.
74. $xy'(xy' + y) = 2y^2$.
75. $y'^2 + xy = y^2 + xy'$.
76. $(x^2 - 2xy)y'^2 + 2xyy' + y^2 - 2xy = 0$.
77. $x(y'^2 - 1) = 2y'$.
78. $x = y' \ln y'$.
79. $y = y'^2 e^{y'}$.
80. $y' \ln y' - y = 0$.
81. $y = 2xy' + y^2 y'^3$.
82. $2xy' - y = y' \ln(yy')$.
83. $y + xy' = 4\sqrt{y'}$.
84. $xy'(y' + 2) = y$.
85. $y = xy'^2 + y'^2$.
86. $2xy' - y = \ln y'$.
87. $y = 2xy' - 4y'^3$.
88. $y = xy' - y'^2$.
89. $y = xy' + \frac{y'}{y'-1}$.
90. $y = xy' + \sqrt{1 + y'^2}$.
91. $y''' = 4x \sin 2x$.
92. $y'' = \frac{x}{\sqrt{(x^2+1)^3}}$.
93. $y'' = \frac{1}{1+x^2}$.
94. $y' = xy'' + y''^2$.
95. $xy'' + y' = x^2 - 1$.
96. $(y^2 + 1)y'' + 2yy'^2 = 0$.
97. $y^3 y'' = 1$.
98. $y'' = y'^2 + 1$.
99. $2yy'' - y'^2 = 1$.
100. $y'^2 + 2yy'' = 0$.