

Часть 1. Дифференциальные уравнения первого порядка

Задача 1.1. Уравнения с разделяющимися переменными $y' = f(x) \cdot g(y)$.

Найти общий интеграл дифференциального уравнения.

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| 1. $x^3 y dy = (x - 1) dx$ | 2. $\cos^2 y dx + \sqrt{1 - x^2} dy = 0$ |
| 3. $(x^2 - 1) y' + 2xy^2 = 0$ | 4. $\sqrt{1 - x^2} dy + \frac{\arcsin^2 x}{y} dx = 0$ |
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| 5. $\sqrt{1 - y^2} dx + y\sqrt{1 - x^2} dy = 0$ | 6. $y \ln y + xy' = 0$ |
| 7. $x(y^2 - 4) dx + \frac{y}{x^2} dy = 0$ | 8. $y' = y^2 - y$ |
| 9. $2y(1 + x^2) y' + (1 + y^2) = 0$ | 10. $y(1 + \ln y) + xy' = 0$ |
| 11. $\cos^2 x dy = e^{-2y} dx$ | 12. $y' \cdot \operatorname{ctg} x + y = 2$ |
| 13. $x^2 y' - y = 3$ | 14. $\sqrt{1 + y^2} dx = xy dy$ |
| 15. $(1 + x^2) y' = 4x/y$ | 16. $xy' + y^2(\frac{1}{x} - 3x) = 0$ |
| 17. $\sqrt{xy'} = y^2 + 1$ | 18. $(x + 1) y' + y(y + 1) = 0$ |
| 19. $(1 + y^2) dx = xy dy$ | 20. $x(1 + y) y' = y^2$ |

Задача 1.2. Однородные дифференциальные уравнения $y' = f(\frac{y}{x})$

Найти общий интеграл дифференциального уравнения

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| 1. $xy' + \sqrt{x^2 + y^2} = y$ | 2. $xy' = \sqrt{y^2 - x^2} + y$ |
| 3. $y' = \frac{x+y}{x-y}$ | 4. $y' - 3 \cos^2 \frac{y}{x} = \frac{y}{x}$ |
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| 5. $y' + e^{y/x} = y/x$ | 6. $y' = \frac{y^2}{x^2} + 2\frac{y}{x} - 6$ |
| 7. $y^2 + x^2 y' = 2xy y'$ | 8. $xy' = y(1 - 3 \ln \frac{y}{x})$ |
| 9. $xy' - y = (x + y) \ln \frac{x+y}{x}$ | 10. $(x^2 - 2xy) y' = xy - y^2$ |
| 11. $y' = \frac{y^2}{x^2} - 2\frac{y}{x} + 2$ | 12. $x + 2y = xy'$ |
| 13. $xy' + 2x \operatorname{tg} \frac{y}{x} = y$ | 14. $y' = \frac{y-2x}{x+2y}$ |
| 15. $y + \sqrt{xy} = xy'$ | 16. $y' = \frac{y}{x} + \frac{1}{\cos \frac{y}{x}}$ |
| 17. $xy' = \frac{x^2 + y^2}{x+y}$ | 18. $3x^3 y' = y(3x^2 - y^2)$ |
| 19. $x^2 + y^2 = xy y'$ | 20. $xy' + x + 2y = 0$ |

Задача 1.3. Линейные дифференциальные уравнения $y' + f(x) \cdot y = g(x)$

1. Найти общий интеграл дифференциального уравнения.

2. Решить задачу Коши.

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| 1. $xy' + y = 3e^{3x}, y(1) = e^3$ | 2. $y' + 2y = 4x + e^x, y(0) = 1/3$ |
| 3. $xy' + 2y = 4x^2, y(1) = 3$ | 4. $xy' - 2y = x^3 \cos 2x, y(\pi/4) = 0$ |
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| 5. $y' + y \operatorname{tg} x = e^{2x} \cos x, y(0) = 3/2$ | 6. $y' + y \operatorname{ctg} x = \frac{e^x}{\sin x}, y(\pi/2) = e^{\pi/2}$ |
| 7. $(x^2 - 1) y' + 2xy = 2 \sin 2x, y(0) = -4$ | 8. $y' - \frac{2xy}{1+x^2} = 1, y(0) = 1$ |
| 9. $y' - y = \frac{e^x}{\cos^2 x}, y(0) = 6$ | 10. $2xy' - 6y = -x^2, y(2) = 10$ |
| 11. $(x + 1) y' - 2y = 4(x + 1), y(0) = -2$ | 12. $y' - 2y = xe^x, y(0) = 2$ |
| 13. $y' + 2xy = e^{-x^2}(1 + 3x^2), y(0) = 5$ | 14. $xy' - y = x^3 \cos 2x, y(\pi) = \pi/4$ |
| 15. $y' - \frac{y}{x+1} = e^x(x + 1), y(0) = 2$ | 16. $y' - y \operatorname{tg} x = \frac{1}{\cos^3 x}, y(0) = 7$ |
| 17. $x \ln x \cdot y' + y = x^2 \ln x, y(e) = 0$ | 18. $y' + 3y = e^{-3x} \cos x, y(0) = 5$ |
| 19. $y \operatorname{sh} x + y' \operatorname{ch} x = x, y(0) = 3$ | 20. $x \ln x \cdot y' - y = 8 \ln^3 x, y(e) = 3$ |

Задача 1.4. Уравнения Бернулли $y' + f(x) \cdot y = g(x) \cdot y^n$

Найти общий интеграл дифференциального уравнения.

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| 1. $xy' - y = -3xy^3$ | 2. $xy' + y + (3x - 1)\sqrt{y} = 0$ |
| 3. $y' - y \operatorname{tg} x = -y^2 \cos x$ | 4. $\sqrt{xy}(xy' + 2y) = 1$ |
| 5. $y' - y \operatorname{tg} x = -y^2 \sin x$ | 6. $xy' + (4 + 7\sqrt{x})y^3 = 2y$ |
| 7. $2xy' + (4x - 1)y^2 - 2y = 0$ | 8. $y' \sin x + y \cos x = -y^3 \sin^4 x$ |
| 9. $xy' - 4y = x^2 \sqrt{y}$ | 10. $x \ln xy' + y = x^2 y^2 \ln x$ |
| 11. $xy' + y = y^2 \ln x$ | 12. $x \ln xy' - y = y^3 \ln x$ |
| 13. $xy' + y = 3x^2 y^2$ | 14. $y' + 2xy = 2xy^2$ |
| 15. $y' - \frac{y}{x} = xy^2$ | 16. $xy' + y = 2x^2 y^2 e^{2x}$ |
| 17. $y' - \frac{y}{x} = e^x y^2$ | 18. $y' + xy = (1 + x)e^{-x} y^2$ |
| 19. $2xy' - y = 4xy^3$ | 20. $xy' + y = 2y^2 \ln x$ |

Задача 1.5. Все изученные типы дифференциальных уравнений 1 порядка

Найти общий интеграл дифференциального уравнения.

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| 1. $xy' - y = \sqrt{x^2 - y^2}$ | 16. $y = (\sqrt{xy} + x) y'$ |
| 2. $2(xy' + y) = xy^2$ | 17. $y' - xy^2 = 2xy$ |
| 3. $(y + 2)y' = y^3 \sin 2x$ | 18. $xy = (x^2 + 2y^2) y'$ |
| 4. $y' + 2y = 4x + e^x$ | 19. $xy' + y = xy^2$ |
| 5. $y' + 2 \sin^2 \frac{y}{x} = \frac{y}{x}$ | 20. $xy' - 4y = x^5 e^{2x}$ |
| 6. $y' + 3y^2 = 3y$ | 21. $y' - y = xy^2$ |
| 7. $y' - y \operatorname{th} x = \operatorname{ch}^2 x$ | 22. $xyy' = 1 - x^2$ |
| 8. $3(xy' + y) = y^2 \ln x$ | 23. $xy' + y = y^2 \lg x$ |
| 9. $y' = \frac{3y}{x} + x \cos \frac{1}{x}$ | 24. $xy + y^2 = (4x^2 + xy) y'$ |
| 10. $(4 + x^2) y' = 2\sqrt[3]{y^2}$ | 25. $yy' = \frac{1-2x}{y}$ |
| 11. $(3xy + y^2) = x^2 y'$ | 26. $2(y' + y) = xy^2$ |
| 12. $y' \operatorname{tg} x - y = 5$ | 27. $yy' = \frac{1-2x}{y}$ |
| 13. $y' - y = 2xy^2$ | 28. $yy' = \frac{1-2x}{y}$ |
| 14. $y' - y \operatorname{ctg} x = 3 \sin x \cdot e^{3x}$ | 29. $y' = \frac{x+3y}{3x-y}$ |
| 15. $xy' + y = \sin x$ | 30. $xy' + y = y^2$ |

Решить задачу Коши.

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| 1. $y' - y \operatorname{tg} x = \frac{1}{\cos x}, y(0) = 4$ | 11. $y' \cos^2 x = \frac{y}{\ln y}, y(0) = 1$ |
| 2. $x^2 y' = y(x + 2y), y(1) = 1$ | 12. $(xy' - y) e^{\frac{y}{x}} = x, y(1) = 0$ |
| 3. $y' + \frac{y}{x} = xy^2, y(-1) = 1$ | 13. $yy' \operatorname{ctg} x - \cos x(1 - y^2) = 0, y(0) = 0$ |
| 4. $x\sqrt{y^2 - 1} + yy'\sqrt{1 + x^2} = 0, y(0) = 0$ | 14. $x(y' - y) = (1 + x^2)e^x, y(1) = 0$ |
| 5. $y' \cos \frac{y}{x} = \frac{y}{x} \cos \frac{y}{x} - 1, y(1) = 0$ | 15. $y' - \frac{y}{x} = -x^2 + 5, y(1) = 1/2$ |
| 6. $2xyy' - y^2 + x = 0, y(1) = 1$ | 16. $x(y^2 - 4) dx + y dy = 0, y(0) = 0$ |
| 7. $(1 + x)y' - 2y = 4x, y(0) = 2$ | 17. $y' + 2xy = 2x^3 y^3, y(0) = \sqrt{2}$ |
| 8. $(xy^2 + x) dx + (x^2 y - y) dy = 0, y(2) = 0$ | 18. $y' - 3x^2 y = \cos x e^{x^3}, y(0) = 0$ |
| 9. $2x^2 y' = x^2 + y^2, y(1) = 2$ | 19. $xy' - y^2 - 4 = 0, y(1) = 0$ |
| 10. $xy' + 2y = \sqrt{x}, y(1) = 7/5$ | 20. $y' + \operatorname{tg} x \cdot y = y^3, y(0) = 1$ |

Часть 2. Дифференциальные уравнения, допускающие понижение порядка

Задача 2.1. Уравнения вида $y^{(n)} = f(x)$, явно не содержащие искомую функцию y .

Решить дифференциальное уравнение.

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| 1. $y'''x = 6x + 4$ | 2. $y'' = x \sin x$ | 3. $\cos^2 x \cdot y'' = 1$ |
| 4. $y'' = xe^{-x}$ | 5. $y'' = 25 \cos 5x$ | 6. $y'' = \ln x$ |
| 7. $y'' = (x + 1) \cos x$ | 8. $y'' = 6x + 8 \sin^2 x$ | 9. $y''' = \frac{\ln x}{x^2}$ |
| 10. $y''' = x + 4 \cos^2 x$ | 11. $e^{-2x} \cdot y'' = 8x$ | 12. $y'' + 2 \sin x \cos^3 x = 0$ |
| 13. $xy''' = 2x + 3$ | 14. $y''(x^2 + 1) = 1$ | 15. $y''' = \frac{24}{(x+2)^5}$ |
| 16. $y'' = \frac{6}{x^3}$ | 17. $y'' = x \ln x$ | 18. $xy'' = \ln x$ |
| 19. $y'' = xe^x$ | 20. $y'' = 8x \cdot \operatorname{ch} 2x$ | 21. $x^3 y''' = 2$ |
| 22. $xy'' = 1 + x^2$ | 23. $x^2 y^{(IV)} + 1 = 0$ | 24. $xy''' = 1$ |

Задача 2.2. Уравнения вида $F(x, y^{n-1}, y^n)$, явно не содержащие искомую функцию y .

Решить дифференциальное уравнение.

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| 1. $y''' \operatorname{tg} x = y'' + 1$ | 2. $xy'' - x = x^2 - y'$ | 3. $y'' \operatorname{ctg} x = y' - 1$ |
| 4. $x(y'' - 4) + y' = 0$ | 5. $y^{IV} \operatorname{cth} 2x = 2y'''$ | 6. $x^4 y'' + x^3 y' = 4$ |
| 7. $(2 + \sin x)y''' = y'' \cdot \cos x$ | 8. $xy'' = y' + 3x^3$ | 9. $xy'' - y' = 0$ |
| 10. $xy''' + 2y'' = 0$ | 11. $xy'' - y' = x^2 e^x$ | 12. $xy'' = y' + x^2 \sin x$ |
| 13. $y'' + \frac{y'}{x} = 0$ | 14. $xy'' = 2y' - x$ | 15. $2xy'' - y' = 0$ |
| 16. $y'' - \frac{y'}{x-1} = 3x^2(x-1)$ | 17. $y^V = y^{IV}$ | 18. $xy'' = y' + x^2 \cos x$ |
| 19. $xy''' = y'' - xy''$ | 20. $y'' - \operatorname{ctg} x \cdot y' = \operatorname{ctg} x$ | 21. $y''' \operatorname{tg} 5x = 5y''$ |
| 22. $(e^x - 1)y''' - e^x y'' = 0$ | 23. $(1 + x^2)y'' = 2xy'$ | 24. $y'' x \ln x = y'$ |

Задача 2.3. Уравнения вида $F(y, y', y'')$, явно не содержащие независимую переменную x .

Решить задачу Коши.

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| 1. $y'' + 2y(y')^3 = 0, y(0) = 2, y'(0) = \frac{1}{3}$ | 2. $y'' = 2y^3, y(-1) = 1, y'(-1) = 1$ |
| 3. $y'' = 2 \sin^3 y \cdot \cos y, y(1) = \pi/2, y'(1) = 1$ | 4. $y'' + (y')^2 = 0, y(0) = 0, y'(0) = 1$ |
| 5. $3y'y'' = 2y, y(1) = 1, y'(1) = 1$ | 6. $yy'' - (y')^2 = y', y(0) = 2, y'(0) = 1$ |
| 7. $y'' = y'e^y, y(2) = 0, y'(2) = 1$ | 8. $2y'' + (y')^4 = 0, y(0) = 1, y'(0) = 1$ |
| 9. $y'' = \sin y \cdot y', y(3) = 0, y'(3) = -1$ | 10. $y''y^3 + 64 = 0, y(0) = 4, y'(0) = 2$ |
| 11. $\operatorname{tg} y \cdot y'' = 2(y')^2, y(1) = \pi/2, y'(1) = 2$ | 12. $y'' = 8y^3, y(0) = 1, y'(0) = 2$ |
| 13. $yy'' + 4(y')^2 = 0, y(0) = 1, y'(0) = 1/5$ | 14. $y'' + 2 \sin y \cos^3 y = 0, y(2) = 0, y'(2) = 1$ |
| 15. $y'' = 2yy'', y(4) = 1, y'(4) = 1$ | 16. $y'' = y\sqrt{y'}, y(0) = 6, y'(0) = 9$ |
| 17. $y'' = y' + (y')^2, y(2) = 0, y'(2) = 1$ | 18. $y'' = 128y^3, y(0) = 1, y'(0) = 8$ |
| 19. $y'' = (y')^2, y(1) = 0, y'(1) = 1$ | 20. $y'' = 2e^{4y}, y(2) = 0, y'(2) = 1$ |
| 21. $y'' = y' \cos y, y(0) = \frac{\pi}{2}, y'(0) = 1$ | 22. $yy'' + (y')^2 = 0, y(1) = \sqrt{2}, y'(1) = 1/\sqrt{2}$ |
| 23. $2yy'' + (y')^2 = 0, y(1) = 2, y'(1) = 1/\sqrt{2}$ | 24. $y'' = 72y^3, y(2) = 1, y'(2) = 6$ |

Задача 2.4. Разные типы дифференциальных уравнений, допускающих понижение порядка.

Решить дифференциальное уравнение.

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| 1. $y'' = \sqrt{1 - (y')^2}$ | 2. $y'' = 2 \cos x \sin^2 x$ | 3. $y''' + \frac{y''}{x} = 0$ |
| 4. $xy''' - y'' + \frac{1}{x} = 0$ | 5. $y'' + \frac{2}{1-y}(y')^2 = 0$ | 6. $y'' = \cos^3 x$ |
| 7. $(y'')^2 = y'$ | 8. $(y'')^2 = y'$ | 9. $y'' = e^{x/2} + 15\sqrt{x}$ |
| 10. $y'' = 1 + \ln x$ | 11. $y^3 y'' = 4y^4 - 4$ | 12. $xy'' = y' \ln y'$ |
| 13. $y'' = 8 \sin^3 y \cos y$ | 14. $y'' = 4x \operatorname{sh} 2x$ | 15. $2xy'' = 1 + y'$ |

Часть 3. Линейные дифференциальные уравнения

Задача 3.1. Найти общее решение линейного однородного дифференциального уравнения с постоянными коэффициентами.

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| 1. $y'' + 2y' - 3y = 0$ | 2. $y'' + 4y' + 4y = 0$ | 3. $y'' - 9y = 0$ |
| 4. $y'' + 9y = 0$ | 5. $y'' + 9y' = 0$ | 6. $y''' + y'' - 20y' = 0$ |
| 7. $y'' - 6y' + 10y = 0$ | 8. $y'' - 4y' - 5y = 0$ | 9. $y'' - 4y' + 5y = 0$ |
| 10. $y^{IV} + 63y'' - 64y = 0$ | 11. $y^{IV} - 10y'' + 25y = 0$ | 12. $y''' + 4y'' + 5y' = 0$ |
| 13. $y'' - 3y' - 10y = 0$ | 14. $y'' - 6y' + 9y = 0$ | 15. $y'' + 10y' + 29y = 0$ |
| 16. $y''' + 12y'' + 40y' = 0$ | 17. $y^{IV} + 3y''' - 4y = 0$ | 18. $y'' - 3y' - 4y = 0$ |
| 19. $y^{IV} + 14y''' + 49y'' = 0$ | 20. $y''' + 4y'' - 12y' = 0$ | 21. $y'' - 4y' = 0$ |
| 22. $y'' - 4y = 0$ | 23. $y'' + 4y = 0$ | 24. $y'' - 2y' + 2y = 0$ |
| 25. $y^{IV} + 48y'' - 49y = 0$ | 26. $y^{IV} + 3y''' - 28y'' = 0$ | 27. $y'' + 12y' + 36y = 0$ |
| 28. $y''' + 6y'' + 10y' = 0$ | 29. $y'' + 21y' - 100y = 0$ | 30. $y'' - y' - 6y = 0$ |
| 31. $y''' - 8y'' + 16y' = 0$ | 32. $y''' - 14y'' + 50y' = 0$ | 33. $y^{IV} + 7y'' - 144y = 0$ |
| 34. $y''' + y'' - 2y' = 0$ | 35. $y^{IV} + 10y''' + 25y'' = 0$ | 36. $y'' + 2y' + 10y = 0$ |
| 37. $y'' + 8y' - 9y = 0$ | 38. $y^{IV} - 4y''' - 5y'' = 0$ | 39. $y'' - 10y' + 25y = 0$ |
| 40. $y''' + 2y'' + 5y' = 0$ | 41. $y'' - 12y' - 64y = 0$ | 42. $y'' - 2y' - 8y = 0$ |
| 43. $y''' + 8y'' + 16y' = 0$ | 44. $y^{IV} - 10y''' + 26y'' = 0$ | 45. $y^{IV} + 16y'' - 225y = 0$ |
| 46. $y''' + 3y'' - 4y' = 0$ | 47. $y^{IV} - 12y''' + 36y'' = 0$ | 48. $y'' + 8y' + 17y = 0$ |
| 49. $y^{IV} + 24y'' - 25y = 0$ | 50. $y^{IV} + 3y''' - 18y'' = 0$ | 51. $y''' - 10y'' + 25y' = 0$ |
| 52. $y'' - 6y' + 13y = 0$ | 53. $y^{IV} - 80y'' - 81y = 0$ | 54. $y'' + y' - 12y = 0$ |
| 55. $y''' - 14y'' + 49y' = 0$ | 56. $y^{IV} - 2y''' + 5y'' = 0$ | 57. $y^{IV} + 15y'' - 16y = 0$ |
| 58. $y''' - 2y'' - 15y' = 0$ | 59. $y^{IV} + 6y''' + 9y'' = 0$ | 60. $y'' - 8y' + 20y = 0$ |

Задача 3.2.

- 1) Найти общее решение линейного однородного уравнения.
- 2) Найти частное решение линейного неоднородного уравнения методом неопределенных коэффициентов. Сделать проверку.
- 3) Найти общее решение неоднородного уравнения.

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| 1. $y'' + 3y' + 2y = 2e^{3x}$ | 2. $y'' + 3y' + 2y = e^{-x}$ |
| 3. $y'' + 3y' + 2y = 4$ | 4. $y'' + 2y' + 2y = e^{2x}$ |
| 5. $y'' + 4y' + 5y = 8 \sin x$ | 6. $y'' + 25y = 5x + 10$ |
| 7. $y'' + 25y' = 5x + 10$ | 8. $y'' + 25y = 5x + 2e^{-x}$ |
| 9. $y'' + 5y' + 6y = e^x$ | 10. $y'' + 5y' + 6y = 3e^{-2x}$ |
| 11. $y'' + 5y' + 6y = 6x$ | 12. $y'' + 2y' + 10y = \sin 3x + 2 \cos 3x$ |
| 13. $y'' + 2y' + 10y = 5x^2 + 2$ | 14. $y'' + y' = x + 1$ |
| 15. $y'' - 4y' + 3y = 6x + 5$ | 16. $y''' + 9y' = 9x^2 - 7$ |
| 17. $y'' - 5y' - 6y = 4e^{2x}$ | 18. $y'' - 5y' - 6y = -7e^{-x}$ |
| 19. $y'' - 4y' + 5y = 4 \sin x$ | 20. $y'' - 5y' + 4y = 2x^2 - 5x + 5$ |
| 21. $y''' - 6y'' + 10y' = 20x - 2$ | 22. $y'' - 4y' + 3y = 2e^{-x}$ |
| 23. $y'' - 4y' + 3y = -2e^x$ | 24. $y'' + 16y = 7 \cos 3x + 14 \sin 3x$ |
| 25. $y'' + 2y' + y = 3x + 7$ | 26. $y''' + 6y'' + 10y' = 15x^2 + 18x + 13$ |
| 27. $y'' - 9y' + 8y = 3e^{2x}$ | 28. $y'' - 9y' + 8y = 7e^x$ |
| 29. $y'' - 5y' + 6y = 5 \cos x$ | 30. $y'' + 3y' - 4y = 2e^{-3x}$ |
| 31. $y'' + 3y' - 4y = 5e^x$ | 32. $y'' - 9y = 18 \cos 3x - 9 \sin 3x$ |
| 33. $y'' + 9y = 9x^2 + 9x + 2$ | 34. $y''' + 4y'' + 4y' = 16x + 20$ |
| 35. $y'' + y' - 6y = 2e^{3x}$ | 36. $y'' + y' - 6y = 5e^{2x}$ |
| 37. $y'' - 2y' + 5y = 13 \sin 3x$ | 38. $y'' + 4y' + 4y = -3x - 2$ |
| 39. $y''' - 2y'' + 5y' = 15x^2 - 12x - 4$ | 40. $y'' - 7y' + 6y = 2e^{2x}$ |

Задача 3.3. Решить линейное неоднородное дифференциальное уравнение методом вариации постоянной.

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| <p>1. $y'' + 4y = \frac{1}{\sin 2x}$</p> <p>3. $y'' + 4y' + 5y = \frac{e^{-2x}}{\cos^2 x}$</p> <hr style="border: 0.5px solid black;"/> <p>5. $y'' - 2y' + y = \frac{1}{\sqrt{4-x^2}}$</p> <p>7. $y'' + 4y' + 4y = \frac{e^{-2x}}{x^2}$</p> <p>9. $y'' + 16y = \frac{1}{\cos 4x}$</p> <p>11. $y'' - 2y' + y = \frac{e^x}{\sqrt{x^2 - 4}}$</p> <p>13. $y'' - 4y' + 4y = \frac{e^{2x}}{x^3}$</p> <p>15. $y'' + 2y' + 2y = \frac{e^{-x}}{\cos x}$</p> <p>17. $y'' - 2y' + 2y = \frac{\sin x}{e^{2x}}$</p> <p>19. $y'' - 4y' + 4y = \frac{1}{x^3}$</p> | <p>2. $y'' + 4y' + 4y = e^{-2x} \ln x$</p> <p>4. $y'' - 2y' + y = \frac{e^x}{x}$</p> <hr style="border: 0.5px solid black;"/> <p>6. $y'' + 9y = \frac{1}{\cos^3 3x}$</p> <p>8. $y'' - 2y' + y = \frac{e^x}{x^2 - 4}$</p> <p>10. $y'' + 4y = \frac{1}{\cos^2 2x}$</p> <p>12. $y'' + y = \frac{1}{\sin^3 x}$</p> <p>14. $y'' - 2y' + y = \frac{e^x}{x^2 + 4}$</p> <p>16. $y'' - 2y' + 2y = \frac{e^x}{\sin^2 x}$</p> <p>18. $y'' + y = \operatorname{ctg} x$</p> <p>20. $y'' - y' = \frac{e^{2x}}{\sqrt{e^{2x} - 1}}$</p> |
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Задача 3.4. Решить задачу Коши для системы линейных дифференциальных уравнений.

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| <p>1 $\left\{ \begin{array}{l} \dot{x} = x - 5y \quad x(0) = 4 \\ \dot{y} = -x - 3y \quad y(0) = -2 \end{array} \right.$</p> <p>3 $\left\{ \begin{array}{l} \dot{x} = 5x + 8y \quad x(0) = 6 \\ \dot{y} = 3x + 3y \quad y(0) = -2 \end{array} \right.$</p> <hr style="border: 0.5px solid black;"/> <p>5 $\left\{ \begin{array}{l} \dot{x} = 2x + 8y \quad x(0) = 6 \\ \dot{y} = x + 4y \quad y(0) = 0 \end{array} \right.$</p> <p>7 $\left\{ \begin{array}{l} \dot{x} = x + 4y \quad x(0) = -1 \\ \dot{y} = 2x - y \quad y(0) = 4 \end{array} \right.$</p> <p>9 $\left\{ \begin{array}{l} \dot{x} = 8x - 3y \quad x(0) = 4 \\ \dot{y} = 2x + y \quad y(0) = 3 \end{array} \right.$</p> <p>11 $\left\{ \begin{array}{l} \dot{x} = 3x + y \quad x(0) = 5 \\ \dot{y} = x + 3y \quad y(0) = -3 \end{array} \right.$</p> <p>13 $\left\{ \begin{array}{l} \dot{x} = x + 4y \quad x(0) = -1 \\ \dot{y} = 2x + 3y \quad y(0) = 2 \end{array} \right.$</p> <p>15 $\left\{ \begin{array}{l} \dot{x} = 2x + 5y \quad x(0) = 2 \\ \dot{y} = x - 2y \quad y(0) = 4 \end{array} \right.$</p> <p>17 $\left\{ \begin{array}{l} \dot{x} = 2x + 3y \quad x(0) = 5 \\ \dot{y} = 5x + 4y \quad y(0) = 3 \end{array} \right.$</p> <p>19 $\left\{ \begin{array}{l} \dot{x} = x + 2y \quad x(0) = 4 \\ \dot{y} = 4x + 3y \quad y(0) = 5 \end{array} \right.$</p> | <p>2 $\left\{ \begin{array}{l} \dot{x} = 3x + y \quad x(0) = 3 \\ \dot{y} = 8x + y \quad y(0) = -6 \end{array} \right.$</p> <p>4 $\left\{ \begin{array}{l} \dot{x} = 2x + y \quad x(0) = 4 \\ \dot{y} = x + 2y \quad y(0) = 2 \end{array} \right.$</p> <hr style="border: 0.5px solid black;"/> <p>6 $\left\{ \begin{array}{l} \dot{x} = x + 3y \quad x(0) = 5 \\ \dot{y} = x - y \quad y(0) = -1 \end{array} \right.$</p> <p>8 $\left\{ \begin{array}{l} \dot{x} = -5x + 2y \quad x(0) = 5 \\ \dot{y} = x - 6y \quad y(0) = -2 \end{array} \right.$</p> <p>10 $\left\{ \begin{array}{l} \dot{x} = -x - 2y \quad x(0) = 3 \\ \dot{y} = 3x + 4y \quad y(0) = -4 \end{array} \right.$</p> <p>12 $\left\{ \begin{array}{l} \dot{x} = 4x - 8y \quad x(0) = 3 \\ \dot{y} = -8x + 4y \quad y(0) = 1 \end{array} \right.$</p> <p>14 $\left\{ \begin{array}{l} \dot{x} = -x + 3y \quad x(0) = 5 \\ \dot{y} = x + y \quad y(0) = 1 \end{array} \right.$</p> <p>16 $\left\{ \begin{array}{l} \dot{x} = x + 2y \quad x(0) = 5 \\ \dot{y} = 4x - y \quad y(0) = 2 \end{array} \right.$</p> <p>18 $\left\{ \begin{array}{l} \dot{x} = 5x + 4y \quad x(0) = 7 \\ \dot{y} = 4x + 5y \quad y(0) = 1 \end{array} \right.$</p> <p>20 $\left\{ \begin{array}{l} \dot{x} = x + 4y \quad x(0) = 2 \\ \dot{y} = x + y \quad y(0) = -3 \end{array} \right.$</p> |
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