

**КОНТРОЛЬНАЯ ТОЧКА С3 (МА2)**  
**«ДИФФЕРЕНЦИАЛЬНЫЕ УРАВНЕНИЯ»**

**Задача 1**

Найдите общее решение дифференциального уравнения.

1.  $4x dx - 3y dy = 3x^2 y dy - 2xy^2 dx.$

2.  $x\sqrt{1+y^2} + yy'\sqrt{1+x^2} = 0.$

3.  $\sqrt{4+y^2} dx - y dy = x^2 y dy.$

4.  $\sqrt{3+y^2} dx - y dy = x^2 y dy.$

5.  $4x dx - 3y dy = 3x^2 y dy - 3xy^2 dx.$

6.  $x\sqrt{3+y^2} dx + y\sqrt{2+x^2} dy = 0.$

7.  $\sqrt{3+y^2} dx + y\sqrt{1-x^2} dy = 0.$

8.  $x\sqrt{3+y^2} dx - y\sqrt{4+x^2} dy = 0.$

9.  $x\sqrt{1+y^2} dx + y\sqrt{1+x^2} dy = 0.$

10.  $x\sqrt{3+y^2} dx + y\sqrt{4+x^2} dy = 0.$

11.  $y(4+e^x) dy - e^x dx = 0.$

12.  $\sqrt{4-x^2} y' + xy^2 + x = 0.$

13.  $\sqrt{3+y^2} + \sqrt{1-x^2} yy' = 0.$

14.  $x dx - y dy = yx^2 dy - xy^2 dx.$

15.  $2x dx - 2y dy = x^2 y dy - 2xy^2 dx.$

16.  $x\sqrt{4+y^2} dx + y\sqrt{1+x^2} dy = 0.$

17.  $(e^x + 8) dy - ye^x dx = 0.$

18.  $\sqrt{5+y^2} + y'y\sqrt{1-x^2} = 0.$

19.  $(1+e^x) yy' = e^x.$

20.  $y \ln y + xy' = 0.$

21.  $(1+e^x) y' = ye^x.$

22.  $\sqrt{1-x^2} y' + xy^2 + x = 0.$

23.  $6x dx - 2y dy = 2yx^2 dy - 3xy^2 dx.$

24.  $x\sqrt{4+y^2} dx - y\sqrt{x^2+1} dy = 0.$

25.  $x\sqrt{3+y^2} dx + y\sqrt{2+x^2} dy = 0.$

**Задача 2**

Найдите решение задачи Коши.

1.  $y' - \frac{y}{x} = x^2, \quad y(1) = 0.$

2.  $y' - \frac{y}{x} = x^2., \quad y(1) = 0.$

3.  $y' - \frac{y}{x} = x^4 - 1., \quad y(1) = \frac{1}{4}.$

4.  $y' - \frac{y}{x} = x., \quad y(1) = 1.$

5.  $y' + \frac{y}{x+2} = x^2 + 2x, \quad y(-1) = \frac{3}{2}.$

6.  $y' - \frac{y}{x} = x \sin x, \quad y\left(\frac{\pi}{2}\right) = 1.$

7.  $y' - \frac{y}{x+1} = e^x(x+1), \quad y(0) = 1.$

8.  $y' + \frac{y}{x} = x^2., \quad y(1) = \frac{1}{4}.$

9.  $y' + \frac{y}{2x} = x^2, \quad y(1) = 1.$

10.  $y' + \frac{y}{x} = x^2 - 2., \quad y(1) = 2.$

11.  $y' - \frac{2y}{x} = 5, \quad y(2) = 4.$

12.  $y' + \frac{y}{x} = \frac{e^x}{x}, \quad y(1) = e.$

$$13. \quad y' + \frac{y}{x} = x^3., \quad y(1) = \frac{1}{5}.$$

$$14. \quad y' - \frac{y}{x} = -\frac{8}{x^2}, \quad y(1) = 4.$$

$$15. \quad y' + \frac{2}{x}y = x^3, \quad y(1) = -\frac{5}{6}.$$

$$16. \quad y' + \frac{y}{x} = 3x, \quad y(1) = 1.$$

$$17. \quad y' - \frac{y}{x} = x^2 + 1., \quad y(1) = \frac{1}{2}.$$

$$18. \quad y' + \frac{y}{x} = x^2 + 1, \quad y(1) = 1.$$

$$19. \quad y' + \frac{3y}{x} = \frac{2}{x}, \quad y(1) = 1.$$

$$20. \quad y' + 2xy = -2x, \quad y(0) = 1.$$

$$21. \quad y' - \frac{y}{x} = x^3 + 1., \quad y(1) = \frac{1}{3}.$$

$$22. \quad y' + \frac{2y}{x} = x^3., \quad y(1) = \frac{1}{6}.$$

$$23. \quad y' - \frac{2y}{x+1} = (x+1)^3, \quad y(0) = \frac{1}{2}.$$

$$24. \quad y' + xy = -x, \quad y(0) = 3.$$

$$25. \quad y' + \frac{y}{x} = x., \quad y(1) = \frac{1}{3}.$$

### Задача 3

Найдите общее решение дифференциального уравнения.

$$1. \quad y'' - 3y' + 2y = e^{-x}.$$

$$2. \quad y'' - y' - 2y = 2x + 2.$$

$$3. \quad y'' - y' - 2y = -2x - 1.$$

$$4. \quad y'' + 2y' + y = xe^x.$$

$$5. \quad 2y'' + 8y = 5x^2 - 2x - 1.$$

$$6. \quad y'' + y' - 2y = \sin x - 2\cos x.$$

$$7. \quad y'' + 2y' + y = 6xe^x.$$

$$8. \quad y'' - y = (2x+1)e^{2x}.$$

$$9. \quad y'' - 6y' + 9y = 2x^2 - x + 3.$$

$$10. \quad y'' + 2y' + y = (3x+2)e^x.$$

$$11. \quad y'' + y' - 2y = \cos x - 3\sin x.$$

$$12. \quad y'' - 3y' + 2y = \cos x - \sin x.$$

$$13. \quad y'' - 9y = (4x+2)e^x.$$

$$14. \quad y'' - y = 5x, \quad y(0) = 0.$$

$$15. \quad y'' + 2y' + y = (9x+6)e^{2x}.$$

$$16. \quad y'' - y = e^{2x}.$$

$$17. \quad y'' - 3y' + 2y = \sin x - 3\cos x.$$

$$18. \quad y'' - 2y' - 3y = \cos x + 2\sin x.$$

$$19. \quad y'' - 4y = 2e^x.$$

$$20. \quad y'' - y = 3e^{-x}.$$

$$21. \quad y'' - 4y = 4e^{2x}.$$

22.  $y'' - y' = 1 + 2x$ .  
 23.  $y'' - 2y' - 3y = 2\sin x - 4\cos x$ .  
 24.  $y'' - 3y' + 2y = \cos x - \sin x$ .  
 25.  $y'' - y = -2e^{-x}$ .

#### Задача 4

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| 1. $\begin{cases} x' = 2x + y, \\ y' = 3x + 4y. \end{cases}$   | 14. $\begin{cases} x' = 3x + y, \\ y' = x + 3y. \end{cases}$   |
| 2. $\begin{cases} x' = x - y, \\ y' = -4x + y. \end{cases}$    | 15. $\begin{cases} x' = 2x + 3y, \\ y' = 5x + 4y. \end{cases}$ |
| 3. $\begin{cases} x' = -x + 8y, \\ y' = x + y. \end{cases}$    | 16. $\begin{cases} x' = x + 2y, \\ y' = 3x + 6y. \end{cases}$  |
| 4. $\begin{cases} x' = -2x - 3y, \\ y' = -x. \end{cases}$      | 17. $\begin{cases} x' = 5x + 4y, \\ y' = 4x + 5y. \end{cases}$ |
| 5. $\begin{cases} x' = x - y, \\ y' = -4x + 4y. \end{cases}$   | 18. $\begin{cases} x' = x + 2y, \\ y' = 4x + 3y. \end{cases}$  |
| 6. $\begin{cases} x' = -2x + y, \\ y' = -3x + 2y \end{cases}$  | 19. $\begin{cases} x' = x + 4y, \\ y' = x + y. \end{cases}$    |
| 7. $\begin{cases} x' = 6x - y, \\ y' = 3x + 2y. \end{cases}$   | 20. $\begin{cases} x' = 3x - 2y, \\ y' = 2x + 8y. \end{cases}$ |
| 8. $\begin{cases} x' = 2x + y, \\ y' = -6x - 3y. \end{cases}$  | 21. $\begin{cases} x' = x + 4y, \\ y' = 2x + 3y. \end{cases}$  |
| 9. $\begin{cases} x' = y, \\ y' = x. \end{cases}$              | 22. $\begin{cases} x' = 7x + 3y, \\ y' = x + 5y. \end{cases}$  |
| 10. $\begin{cases} x' = -x - 2y, \\ y' = 3x + 4y. \end{cases}$ | 23. $\begin{cases} x' = 4x - y, \\ y' = -x + 4y. \end{cases}$  |
| 11. $\begin{cases} x' = -2x, \\ y' = y. \end{cases}$           | 24. $\begin{cases} x' = 2x + 8y, \\ y' = x + 4y. \end{cases}$  |
| 12. $\begin{cases} x' = 4x + 2y, \\ y' = 4x + 6y. \end{cases}$ | 25. $\begin{cases} x' = 5x + 8y, \\ y' = 3x + 3y. \end{cases}$ |
| 13. $\begin{cases} x' = 8x - 3y, \\ y' = 2x + y. \end{cases}$  |  |