

**КОНТРОЛЬНАЯ РАБОТА № 3**

Решить дифференциальные уравнения. Если указано начальное условие, решить задачу Коши.

<b>Вариант 1</b>	<b>Вариант 2</b>
1. $4xdx - 3ydy = 3x^2ydy - 2xy^2dx$ 2. $y' - 3x^2y = x^2(1 + x^3)/3, y(0) = 0$ 3. $y'''x \ln x = y''$ 4. $y^{IV} - 6y''' + 9y'' = 3x - 1$	1. $x\sqrt{1 + y^2} + y \cdot y' \sqrt{1 + x^2} = 0$ 2. $y' - y \cos x = \sin 2x, y(0) = -1$ 3. $xy''' + y'' = 1$ 4. $y^{IV} + y''' = 12x + 6$
<b>Вариант 3</b>	<b>Вариант 4</b>
1. $\sqrt{4 + y^2} dx - ydy = x^2ydy$ 2. $y' - y \cos x = -\sin 2x, y(0) = 3$ 3. $2xy''' = y''$ 4. $y^{IV} + 2y''' + y'' = 2 - 3x^2$	1. $\sqrt{3 + y^2} dx - ydy = x^2ydy$ 2. $y' - 4xy = -4x^3, y(0) = -\frac{1}{2}$ 3. $xy''' + y'' = x + 1$ 4. $y''' - 2y'' = 3x^2 + x - 4$
<b>Вариант 5</b>	<b>Вариант 6</b>
1. $6xdx - 6ydy = 2x^2ydy - 3xy^2dx$ 2. $y' - \frac{y}{x} = -\frac{\ln x}{x}, y(1) = 1$ 3. $\operatorname{tg} x \cdot y'' - y' + \frac{1}{\sin x} = 0$ 4. $y^{IV} + y''' = x$	1. $x\sqrt{3 + y^2} dx + y\sqrt{2 + x^2} dy = 0$ 2. $y' - \frac{2y}{x+1} = e^x(x+1)^2, y(0) = 1$ 3. $x^2y'' + xy' = 1$ 4. $y''' + 3y'' + 2y' = 3x^2 + 2x$
<b>Вариант 7</b>	<b>Вариант 8</b>
1. $(e^{2x} + 5)dy + ye^{2x}dx = 0$ 2. $y' + 2xy = xe^{-x^2} \sin x, y(0) = 1$ 3. $y''' \operatorname{ctg} 2x + 2y'' = 0$ 4. $y''' - y'' = 4x^2 - 3x + 2$	1. $y'y \sqrt{\frac{1-x^2}{1-y^2}} + 1 = 0$ 2. $y' - \frac{2y}{x+1} = (x+1)^3, y(0) = \frac{1}{2}$ 3. $x^3y''' + x^2y'' = 1$ 4. $y^{IV} + 2y''' + y'' = 12x^2 - 6x$
<b>Вариант 9</b>	<b>Вариант 10</b>
1. $6xdx - 6ydy = 3x^2ydy - 2xy^2dx$ 2. $y' + 2xy = -2x^3, y(1) = e^{-1}$	1. $x\sqrt{5 + y^2} dx + y\sqrt{4 + x^2} dy = 0$

3. $\operatorname{tg} x \cdot y''' = 2y''$ 4. $y^V - y^{IV} = 2x + 3$	2. $y' + \frac{xy}{2(1-x^2)} = \frac{x}{2}, y(0) = \frac{2}{3}$ 3. $y''' \operatorname{ctg} 2x = 2y''$ 4. $y^{IV} + 2y''' + y'' = 4x^2$
<b>Вариант 11</b>	<b>Вариант 12</b>
1. $y(4 + e^x)dy - e^x dx = 0$ 2. $y' + xy = -x^3, y(0) = 3$ 3. $x^4 y'' + x^3 y' = 1$ 4. $y^{IV} + 4y''' + 4y'' = x - x^2$	1. $\sqrt{4 - x^2} y' + xy^2 + x = 0$ 2. $y' - \frac{2xy}{1+x^2} = 1 + x^2, y(1) = 3$ 3. $xy''' + 2y'' = 0$ 4. $y''' - y'' = 6x^2 + 3x$
<b>Вариант 13</b>	<b>Вариант 14</b>
1. $2xdx - 2ydy = x^2 ydy - 2xy^2 dx$ 2. $y' + \frac{1-2x}{x^2} y = 1, y(1) = 1$ 3. $(1+x^2)y'' + 2xy' = x^3$ 4. $y^{IV} - 3y''' + 3y'' - y' = 2x$	1. $x\sqrt{4+y^2} dx + y\sqrt{1+x^2} dy = 0$ 2. $y' + \frac{3y}{x} = \frac{2}{x^3}, y(1) = 1$ 3. $x^5 y''' + x^4 y'' = 1$ 4. $y^{IV} - 2y''' + y'' = 2x(1-x)$
<b>Вариант 15</b>	<b>Вариант 16</b>
1. $(e^x + 8)dy - ye^x dx = 0$ 2. $y' - \frac{y}{x} = -\frac{12}{x^3}, y(1) = 4$ 3. $xy''' - y'' + \frac{1}{x} = 0$ 4. $y''' - 5y'' + 6y' = (x-1)^2$	1. $\sqrt{5+y^2} + y'y\sqrt{1-x^2} = 0$ 2. $y' + \frac{2}{x}y = x^3, y(1) = -\frac{5}{6}$ 3. $xy''' + y'' + x = 0$ 4. $y''' - 13y'' + 12y' = 18x^2 - 39$

<b>Вариант 17</b>	<b>Вариант 18</b>
1. $6xdx - ydy = yx^2 dy - 3xy^2 dx$ 2. $y' + \frac{y}{x} = 3x, y(1) = 1$ 3. $\operatorname{tg} x \cdot y^{IV} = y'''$ 4. $y''' - 5y'' + 6y' = 6x^2 + 2x - 5$	1. $y \ln y + xy' = 0$ 2. $y' - \frac{2x-5}{x^2} y = 5, y(2) = 4$ 3. $xy''' + y'' = \sqrt{x}$ 4. $y''' + y'' = 49 - 24x^2$
<b>Вариант 19</b>	<b>Вариант 20</b>
1. $(1+e^x)y' = ye^x$	1. $\sqrt{1-x^2} y' + xy^2 + x = 0$

2. $y' + \frac{y}{x} = \frac{x+1}{x}e^x, y(1) = e$	2. $y' - \frac{y}{x} = -2\frac{\ln x}{x}, y(1) = 1$
3. $y''' \operatorname{tg} x = y'' + 1$	3. $y''' \operatorname{tg} 5x = 5y''$
4. $y''' - 13y'' + 12y' = x - 1$	4. $y''' - y'' = 6x + 5$
<b>Вариант 21</b>	<b>Вариант 22</b>
1. $6x dx - 2y dy = 2yx^2 dy - 3xy^2 dx$	1. $y(1 + \ln y) + xy' = 0$
2. $y' + \frac{y}{x} = \sin x, y(\pi) = \frac{1}{\pi}$	2. $y' + \frac{y}{2x} = x^2, y(1) = 1$
3. $4y^3 y'' = y^4 - 1$	3. $y'' = 128y^3$
4. $y''' - y' = 3x^2 - 2x + 1$	4. $y^{IV} - 3y''' + 3y'' - y' = x - 3$
<b>Вариант 23</b>	<b>Вариант 24</b>
1. $(3 + e^x)yy' = e^x$	1. $\sqrt{3 + y^2} + \sqrt{1 - x^2} yy' = 0$
2. $y' + \frac{2x}{1 + x^2} y = \frac{2x^2}{1 + x^2}, y(0) = \frac{2}{3}$	2. $y - \frac{y}{x+2} = x^2 + 2x, y(-1) = \frac{3}{2}$
3. $y'' y^3 = -64$	3. $y'' + 2 \sin y \cos^3 y = 0$
4. $y''' - 4y'' = 32 - 384x^2$	4. $3y^{IV} + y''' = 6x - 1$
<b>Вариант 25</b>	<b>Вариант 26</b>
1. $x dx - y dy = yx^2 dy - xy^2 dx$	1. $\sqrt{5 + y^2} dx + 4(x^2 y + y) dy = 0$
2. $y' - \frac{y}{x+1} = e^x(x+1), y(0) = 1$	2. $y' - \frac{y}{x} = x \sin x, y\left(\frac{\pi}{2}\right) = 1$
3. $y'' = 32 \sin^3 y \cos y$	3. $y'' y^3 + 49 = 0$
4. $y''' + y'' = 5x^2 - 1$	4. $7y''' - y'' = 12x$

<b>Вариант 27</b>	<b>Вариант 28</b>
1. $(1 + e^x)yy' = e^x$	1. $3(x^2 y + y) dy + \sqrt{2 + y^2} dx = 0$
2. $y' + y \operatorname{tg} x = \cos^2 x, y\left(\frac{\pi}{4}\right) = \frac{1}{2}$	2. $y' + y \cos x = \frac{1}{2} \sin 2x, y(0) = 0$
3. $y'' + 8 \sin y \cos^3 y = 0$	3. $4y^3 y'' = y^4 - 16$
4. $y^{IV} + 2y''' + y'' = x^2 + x - 1$	4. $y^{IV} - y''' = 5(x+2)^3$
<b>Вариант 29</b>	<b>Вариант 30</b>
1. $2x dx - y dy = yx^2 dy - xy^2 dx$	1. $2x + 2xy^2 + \sqrt{2 - x^2} y' = 0$
2. $y' - y \operatorname{ctg} x = 2x \sin x, y\left(\frac{\pi}{2}\right) = 0$	2. $y' - \frac{y}{x} = x^2, y(1) = 0$

$$3. y'' = 50y^3$$

$$4. y''' - y' = x^2 + x$$

$$3. y''y^3 + 25 = 0$$

$$4. y''' + 3y'' + 2y' = 1 - x^2$$