

Контрольная работа по дифференциальным уравнениям

Вариант 1

1 $x^2 y' = 9x^2 - 5xy + y^2$

2. $(1+x^2)y'' - 2xy' = 0$

3 $y' = \frac{1+y^2}{xy(1+x^2)}$ $x_0 = 1$
 $y_0 = 1$

4. $y'' + 4y' - 12y = 8\sin 2x$

5. $xy' - y = 3x^2 - 3$

Вариант 2

1 $xy' - y = x^2 e^x$

2. $5y'' = 2\sqrt{y'+1}$

3 $x^3 y' = y(y^2 + x^2)$ $x_0 = 1, y_0 = 1$

4. $y'' + 4y = e^{-2x}$

5 $y' = \frac{y}{x+2} + 9.$

Вариант 3

1 $xy' + y = x^3$

2 $y'' - (y' - 1)\operatorname{ctgx} = 0$

3 $xy'' = y'$ $x_0 = 2$
 $y_0 = 0, y'_0 = 1$

4. $y'' + 5y' + 6y = 12\cos 2x$

5 . $3xy' = 3y + \frac{x}{1+x^2}$.

Вариант 4

1 $xy' + y = e^{-x}$

2 $y'' + (2y + 5)(y')^3 = 0$

3. $xy' = e^{-y} + 2y'$ $y(e) = 0$

4. $y'' - 4y' + 13y = 26x + 5$

5 . $3xy' - 3y = 2x^3 + 1$.

Вариант 5

$$1 \quad xy' - xy = e^x$$

$$2 \quad y'' - \sqrt{1-y'} = 0$$

$$3 \quad y' - y = e^x \quad y(0) = 2$$

$$4. \quad y'' - 2y' + y = 16e^x$$

$$5 \quad . \quad y' = \frac{y}{x-1} + 4(x^2 - 1).$$

Вариант 6

$$1 \quad x^2 y' = y^2 + 3xy + x^2$$

$$2 \quad y'' = 2(y')^2 \operatorname{ctgy}$$

$$3 \quad y' = 4y, \quad y(2) = 4$$

$$4. \quad y'' - 6y' + 9y = x^2 - x + 3$$

$$5 \quad . \quad 2xy' = 2y + \frac{x}{\sqrt{1-x^2}}.$$

Вариант 9

1 $xy' - y = x^2 e^x$

2 $5y'' = 2\sqrt{y'+1}$

3 $x^3 y' = y(y^2 + x^2)$ $x_0 = 1$
 $y_0 = 1$

4. $y'' - 4y' = 6x^2 + 1$

5 $5y' = \frac{5y}{x} + 4x^2 - 4.5$

Вариант 10

1 $xy' + y = x^3$

2 $y'' - (y'-1)\operatorname{ctg}x = 0$

3 $xy'' = y'$ $x_0 = 2$
 $y_0 = 0, y'_0 = 1$

4. $y'' + 6y' + 9y = 10e^{-3x}$

5 $2xy' = 2y + x \cos x.$

Вариант 11

1 $xy' + y = e^{-x}$

2 $y'' + (2y+5)(y')^x = 0$

3. $xy' = e^{-y} + 2y' \quad y(e) = 0$

4. $y'' - 5y' + 6y = -e^{5x}$

5. $3xy' = 3y + 5x^3$.

Вариант 12

1 $xy' - xy = e^x$

2 $y'' - \sqrt{1-y'} = 0$

3 $y' - y = e^x \quad y(0) = 2$

4. $y'' + 2y' = 6e^{2x}$

5. $xy' - y = 3x^2 - 3$

Вариант 13

$$1 \quad x^2 y' = y^2 + 3xy + x^2$$

$$2 \quad y'' = 2(y')^2 \operatorname{ctgy}$$

$$3 \quad y' = 4y, \quad y(2) = 4$$

$$4. \quad y'' + 4y' - 12y = 8\sin 2x$$

$$5 \quad y' = \frac{y}{x+2} + 9.$$

Вариант 14

$$1 \quad (1 + \ell^x)yy' = \ell^x$$

$$2 \quad x^2 y' + y^2 = 0 \quad y(1) = 1$$

$$3 \quad y'y'' + (y')^2 = 0$$

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

$$5 \quad 3xy' - 3y = 2x^3 + 1.$$

Вариант 15

1 $x^2 y' = 9x^2 - 5xy + y^2$

2. $(1+x^2)y'' - 2xy' = 0$

3 $y' = \frac{1+y^2}{xy(1+x^2)}$ $x_0 = 1$
 $y_0 = 1$

4. $y'' + 5y' + 6y = 12\cos 2x$

5 . $y' = \frac{y}{x-1} + 4(x^2 - 1)$.

Вариант 16

1 $xy' - y = x^2 e^x$

2 $5y'' = 2\sqrt{y'+1}$

3 $x^3 y' = y(y^2 + x^2)$ $x_0 = 1$
 $y_0 = 1$

4. $y'' - 4y' + 13y = 26x + 5$

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

Вариант 17

1 $xy' + y = x^3$

2 $y'' - (y' - 1)\operatorname{ctg}x = 0$

3 $xy'' = y'$ $x_0 = 2$
 $y_0 = 0, y'_0 = 1$

4. $y'' - 2y' + y = 16e^x$

5 $5xy' - 5y = 2x + 1.$

Вариант 18

1 $xy' + y = e^{-x}$

2 $y'' + (2y + 5)(y')^3 = 0$

3. $xy' = e^{-y} + 2y'$ $y(e) = 0$

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

5 $xy' - y = 3x^2 - 3$

Вариант 19

1 $xy' - xy = e^x$

2 $y'' - \sqrt{1-y'} = 0$

3 $y' - y = e^x \quad y(0) = 2$

4. $y'' - 2y' + 5y = xe^{2x}$

5 $5y' = \frac{5y}{x} + 4x^2 - 4.$

Вариант 20

1 $x^2y' = y^2 + 3xy + x^2$

2 $y'' = 2(y')^2 \operatorname{ctgy}$

3 $y' = 4y, \quad y(2) = 4$

4. $y'' - 5y' + 6y = (12x - 7)e^{-x}$

5. $xy' - y = 3x^2 - 3$

Вариант 21

1 $x^2 y' = 9x^2 - 5xy + y^2$

2. $(1+x^2)y'' - 2xy' = 0$

3 $y' = \frac{1+y^2}{xy(1+x^2)}$ $x_0 = 1$
 $y_0 = 1$

4. $y'' + 4y' - 12y = 8\sin 2x$

5

Вариант 22

1 $xy' - y = x^2 e^x$

2. $5y'' = 2\sqrt{y'+1}$

3 $x^3 y' = y(y^2 + x^2)$ $x_0 = 1, y_0 = 1$

4. $y'' + 4y = e^{-2x}$

5 $3xy' = 3y + 5x^3$.

Вариант 23

$$1 \quad xy' + y = x^3$$

$$2 \quad y'' - (y' - 1)\operatorname{ctgx} = 0$$

$$3 \quad xy'' = y' \quad \begin{array}{l} x_0 = 2 \\ y_0 = 0, y'_0 = 1 \end{array}$$

$$4. \quad y'' + 5y' + 6y = 12\cos 2x$$

$$5 \quad y' = \frac{y}{x+2} + 9.$$

Вариант 24

$$1 \quad xy' + y = e^{-x}$$

$$2 \quad y'' + (2y + 5)(y')^3 = 0$$

$$3. \quad xy' = e^{-y} + 2y' \quad y(e) = 0$$

$$4. \quad y'' - 4y' + 13y = 26x + 5$$

$$5 \quad 3xy' - 3y = 2x^3 + 1.$$

Вариант 25

1 $xy' - xy = e^x$

2 $y'' - \sqrt{1-y'} = 0$

3 $y' - y = e^x \quad y(0) = 2$

4. $y'' - 2y' + y = 16e^x$

Вариант 26

1 $x^2y' = y^2 + 3xy + x^2$

2 $y'' = 2(y')^2 \operatorname{ctgy}$

3 $y' = 4y, \quad y(2) = 4$

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

Вариант 29

1 $xy' - y = x^2e^x$

2 $5y'' = 2\sqrt{y'+1}$

3 $x^3y' = y(y^2 + x^2)$ $x_0 = 1$
 $y_0 = 1$

4. $y'' - 4y' = 6x^2 + 1$

Вариант 30

1 $xy' + y = x^3$

2 $y'' - (y' - 1)\operatorname{ctgx} = 0$

3 $xy'' = y'$ $x_0 = 2$
 $y_0 = 0, y'_0 = 1$

4. $y'' + 6y' + 9y = 10e^{-3x}$