

Занятие 11

Дифференциальные уравнения высших порядков

$$422. 2xy'y'' = y'^2 - 1. \quad 9C_1^2 (y - C_2)^2 = 4(C_1x + 1)^3; \quad y = \pm x + C$$

$$425. y'' = 2yy'. \quad y = -\frac{1}{x+C}, \quad y = C_1 \operatorname{tg}(C_1x + C_2), \quad \frac{y-C_1}{y+C_1} = \pm e^{2(C_1x+C_2)}.$$

$$427. y''(e^x + 1) + y' = 0. \quad y = C_1(x - e^{-x}) + C_2$$

$$431. 2yy'' = y^2 + y'^2. \quad y = C_1(1 \pm \operatorname{ch}(x + C_2)); \quad y = Ce^{\pm x}$$

$$434. y'' + y'^2 = 2e^{-y}. \quad e^y + C_1 = (x + C_2)^2$$

$$437. y'' = e^y. \quad e^y \sin^2(C_1x + C_2) = 2C_1^2; \quad e^y \operatorname{sh}^2(C_1x + C_2) = 2C_1^2; \quad e^y (x + C)^2 = 2$$

$$438. y'' - xy''' + y'''^3 = 0. \quad y = C_1 \frac{x^3}{6} - C_1^3 \frac{x^2}{2} + C_2x + C_3; \quad y = \pm \frac{8}{315} x^3 \sqrt{3x} + C_1x + C_2$$

$$456. y'y''' = 2y''^2 \quad y = A \ln(Bx + C); \quad y = C_1x + C_2.$$

$$459. yy'' + y'^2 = 1. \quad y^2 = x^2 + C_1x + C_2$$

$$461. xy'' = 2yy' - y'. \quad y = C_1 \operatorname{tg}(C_1 \ln C_2x); \quad y - C_1 = C_2(y + C_1)|x|^{2C_1}; \quad y \ln Cx = -1$$

ДЗ

$$421. x^2y'' = y'^2 \quad C_1x - C_1^2y = \ln|C_1x + 1| + C_2; \quad 2y = x^2 + C; \quad y = C$$

$$423. y^3y'' = 1 \quad C_1y^2 - 1 = (C_1x + C_2)^2$$

$$428. y''' = y''^2 \quad y = C_3 - (x + C_1) \ln(C_2(x + C_1)); \quad y = C_1x + C_2$$

$$432. y'''^3 + xy'' = 2y' \quad x = C_1p + 3p^2, \quad y = \frac{12}{5}p^5 + \frac{5}{4}C_1p^4 + C_1^2 \frac{p^3}{6} + C_2; \quad y = C$$

$$435. xy''' = y'' - xy'' \quad y = C_1(x + 2)e^{-x} + C_2x + C_3$$

$$440. y^4 - y^3y'' = 1 \quad \ln|y^2 + C_1 \pm \sqrt{y^4 + 2C_1y^2 + 1}| = 2x + C_2; \quad y = \pm 1$$

$$449. yy'' + y = y'^2$$

$$C_1^2y + 1 = \pm \operatorname{ch}(C_1x + C_2); \quad C_1^2y - 1 = \sin(C_1x + C_2); \quad 2y = (x + C)^2; \quad y = 0$$

$$455. \quad yy''' + 3y'y'' = 0 \quad C_2y^2 - C_1 = C_2^2(x + C_3)^2; y = C$$

$$457. \quad yy'' = y'(y' + 1) \quad C_1y - 1 = C_2e^{C_1x}; y = C - x; y = 0$$

$$460. \quad y'' = xy' + y + 1 \quad y = e^{x^2/2} \left(C_1 \int e^{-x^2/2} dx + C_2 \right) - 1$$