Варіанти завдань до лабораторної роботи №2 (ПА-19-2)

№	Крайова задача	Точний розв'язок
1	x(2x+1)y″+2(x+1)y′-2y=0, y′(1)=0, y(3)-y′(3)= $\frac{31}{9}$	$y(x)=x+1+\frac{1}{x}$
2	x(x+4)y″-(2x+4)y′ +2y=0, y′(0)=1, y(2)-y′(2)=3	y(x)=x^2+x+2
3	x(x^2+6)y″-4(x^2+3)y′ +6xy=0, y′(0)=0, y(4)-y′(4)=26	y(x)=x^3+x^2+2
4	(x^2+1)y″-2y=0 y′(0)=2 y(1)= $3+\frac{\pi}{2}$	y(x)=x^2+x+1+(x^2+1)arctg(x)
5	2x(x+2)y″+(2-x)y′ +y=0, y′ (4)+y(4)= $\frac{21}{4}$,	$y(x)=\sqrt{\lvert x\rvert}+x-2$
6	x(x+1)y″+(x+2)y′ -y = x+$\frac{1}{x}$, y′(1)= $\frac{3}{2}$, 4y′ (2)+y(2)= 13+4ln2	$y(x)=x+\frac{7}{2}+\frac{1}{x}+\left(\frac{x}{2}+1\right)\ln\lvert x\rvert$
7	(2x+1)y″+(2x-1)y′ -2y=x^2+x, y′(0)=1, y′(1)+y(1)=5	$y(x)=2x-1+e^{-x}+\frac{x^2+1}{2}$
8	xy″-(2x+1)y′+ +2y=0, y′(0)=2, y (1)=e^2	$y(x)=e^{2x}$
9	(x^2-1) y″+(x-3)y′-y=0, y(0)=-18, y(3)= 0	y(x)=6x-18
10	(x^2+1)y″-2y=0, y′(0)=0, y(2)-y′(2)=1	y(x)=x^2+1
11	(2x+1) y″+4xy′-4y=0, y′ (0)= –1, y′(1)+2y(1)=3	$y(x)=x+e^{-2x}$
12	x^2 lnx y″ – xy′+y=0, y′ (-1)=0, y′ (1)-y(1)=0	y(x)=1+x+lnx

Вар.13

$y''+2y'/(x-4)+(x-4)y=1, \qquad 0\le x\le 1,$

$y(0)=-0,25, \quad y(1)-3y'(1)=0, \qquad y^*=1/(x-4);$

Bap.14

$$y'' + y'/x - 2y = -2x + 1/x - 2\ln(x), \qquad 1 \le x \le 2,$$
$$y(1) = 1, \quad y'(2) = 1{,}5\ , \qquad y^* = x + \ln(x);$$

Bap.15

$$y'' + y'/x - 4y = -4x + 1/x - 4\ln(x), \qquad 1 \le x \le 2,$$
$$y(1) = 1, \quad y'(2) = 1{,}5, \qquad y^* = x + \ln(x);$$

Bap.16

$$y'' + 2xy' - y = 2\cos(x)(x^2 + 1), \qquad 0 \le x \le 0{,}5,$$
$$y'(0) = 0, \quad y(0{,}5) = 0{,}5\sin(0{,}5), \qquad y^* = x\sin(x);$$

Bap.17

$$y'' + 2y' - 4y/x = 1, \qquad 0{,}5 \le x \le 1,$$
$$y'(0{,}5) = 1{,}5, \quad y(1) + y'(1) = 4, \qquad y^* = x^2 + 0{,}5x;$$

Bap.18

$$y'' - y' - 2y = -3e^{-x}, \qquad 0 \le x \le 1,$$
$$y(0) = 1, \quad y(1) + 2y'(1) = 0, \qquad y^* = (x+1)e^{-x};$$

Bap.19

$$y'' + y' - 2y = 2(-x^2 + x + 1), \qquad 0 \le x \le 1,$$
$$y(0) = 1, \quad y(1) - y'(1) = -1, \qquad y^* = e^x + x^2;$$

Bap.20

$$y'' + 3y' - 4y = -2\cos(x) - 8\sin(x), \qquad 0 \le x \le 0{,}5,$$
$$y'(0) = 1, \quad y(0{,}5) + y'(0{,}5) = 2\cos(0{,}5), \quad y^* = \cos(x) + \sin(x);$$

Bap.21

$$y'' + xy' - 2y = -x - 3/x + 2/x^3, \qquad 0.5 \le x \le 1,$$
$$y(0{,}5) = 2{,}5\ , \quad 2y(1) + y'(1) = 4, \qquad y^* = x + 1/x;$$

Bap.22

$$y'' + xy' - x^2 y = 1/x + x\ln(x) + x - x^3\ln(x), \qquad 1 \le x \le 2,$$
$$y'(1) = 1, \quad y(2) = 2\ln(2), \qquad y^* = x\ln(x);$$

Bap.23

$$y'' - y' - xy = -x(x + e^x) - 1, \qquad 1 \le x \le 2,$$
$$y(1) - y'(1) = 0, \quad y'(2) = 1 + e^2, \qquad y^* = x + e^x;$$

Bap.24

$$y'' + xy' - 3y = 2 + 6x - x^2, \qquad 0{,}5 \le x \le 1,$$
$$y(0{,}5) = 0{,}375, \quad y(1) - y'(1) = -3, \qquad y^* = x^2(x+1).$$