Практичне заняття № 13

Контрольна робота №4

Варіант № 1

1.

$$u_{tt} - 4u_{xx} = (x-1)e^{2t}, \quad (x,t) \in Q := (0,2) \times (0,11],$$
$$u|_{x=0} = 3e^{2t}, \quad u_x|_{x=2} = 0, \quad t \in (0,11],$$
$$u|_{t=0} = \sin 2x, \quad u_t|_{t=0} = 1, \quad x \in [0,2].$$

2.

$$u_{tt} - 16(u_{xx} + u_{yy}) = y\cos 2t, \quad (x,y,t) \in Q := (0;2) \times (0;3) \times (0;14],$$
$$\begin{cases} u_x|_{x=0} = 0, \quad u|_{x=2} = 0, \quad (y,t) \in (0,3) \times (0,14], \\ u|_{y=0} = 0, \quad u_y|_{y=3} = 0, \quad (x,t) \in [0,2] \times (0,14], \end{cases}$$
$$u|_{t=0} = 3x, \quad u_t|_{t=0} = 7y, \quad (x,y) \in \overline{\Omega} := [0;2] \times [0;3].$$

Варіант № 2

1.

$$u_{tt} - 9u_{xx} = (x-1)e^{3t}, \quad (x,t) \in Q := (0;3) \times (0;10],$$
$$u_x|_{x=0} = 0, \quad u|_{x=3} = 2e^{3t}, \quad t \in (0;10],$$
$$u|_{t=0} = \cos 2x, \quad u_t|_{t=0} = 2, \quad x \in [0;3].$$

2.

$$u_{tt} - 25(u_{xx} + u_{yy}) = y\cos 2t, \quad (x,y,t) \in Q := (0;4) \times (0;3) \times (0;14],$$
$$\begin{cases} u|_{x=0} = 0, \quad u_x|_{x=4} = 0, \quad (y,t) \in (0;3) \times (0;14], \\ u_y|_{y=0} = 0, \quad u|_{y=3} = 0, \quad (x,t) \in [0;4] \times (0;14], \end{cases}$$
$$u|_{t=0} = 3y, \quad u_t|_{t=0} = 2x, \quad (x,y) \in \overline{\Omega} := [0;4] \times [0;3].$$

Варіант № 3

1.

$$u_{tt} - 16u_{xx} = (x-1)\sin 3t, \quad (x,t) \in Q := (0;3) \times (0;15],$$
$$u_x|_{x=0} = 0, \quad u|_{x=3} = 2\sin 3t, \quad t \in (0;15],$$
$$u|_{t=0} = 3, \quad u_t|_{t=0} = \cos 2x, \quad x \in [0;3].$$

2.

$$u_{tt} - 9(u_{xx} + u_{yy}) = ye^{2t}, \quad (x,y,t) \in Q := (0;6) \times (0;4) \times (0;14],$$
$$\begin{cases} u_x|_{x=0} = 0, \quad u|_{x=6} = 0, \quad (y,t) \in (0;4) \times (0;14], \\ u_y|_{y=0} = 0, \quad u|_{y=4} = 0, \quad (x,t) \in [0;6] \times (0;14], \end{cases}$$
$$u|_{t=0} = 3y + 2, \quad u_t|_{t=0} = 4x, \quad (x,y) \in \overline{\Omega} := [0;6] \times [0;4].$$

Варіант № 4

1.

$$u_{tt} - 4u_{xx} = 3x\cos 3t, \quad (x,t) \in Q := (0;4) \times (0;16],$$
$$u|_{x=0} = 0, \quad u|_{x=4} = 2\cos 3t, \quad t \in (0;16],$$
$$u|_{t=0} = 3, \quad u_t|_{t=0} = \sin 2x, \quad x \in [0;4].$$

2.

$$u_{tt} - 9(u_{xx} + u_{yy}) = ye^{4t}, \quad (x,y,t) \in Q := (0;3) \times (0;4) \times (0;15],$$
$$\begin{cases} u_x|_{x=0} = 0, \quad u|_{x=3} = 0, \quad (y,t) \in (0;4) \times (0;15], \\ u|_{y=0} = 0, \quad u|_{y=4} = 0, \quad (x,t) \in [0;3] \times (0;15], \end{cases}$$
$$u|_{t=0} = 3y, \quad u_t|_{t=0} = 4x, \quad (x,y) \in \overline{\Omega} := [0;3] \times [0;4].$$

Варіант № 5

1.

$$u_{tt} - 25u_{xx} = 5x\cos 4t, \quad (x,t) \in Q := (0;3) \times (0;16],$$
$$u|_{x=0} = 0, \quad u_x|_{x=3} = 2\cos 4t, \quad t \in (0;16],$$
$$u|_{t=0} = 3\sin 2x, \quad u_t|_{t=0} = 2, \quad x \in [0;3].$$

2.

$$u_{tt} - 9(u_{xx} + u_{yy}) = y\sin 4t, \quad (x,y,t) \in Q := (0;4) \times (0;4) \times (0;16],$$
$$\begin{cases} u|_{x=0} = 0, \quad u_x|_{x=4} = 0, \quad (y,t) \in (0;4) \times (0;16], \\ u|_{y=0} = 0, \quad u_y|_{y=4} = 0, \quad (x,t) \in [0;4] \times (0;16], \end{cases}$$
$$u|_{t=0} = 3y + 4, \quad u_t|_{t=0} = 2x, \quad (x,y) \in \overline{\Omega} := [0;4] \times [0;4].$$

Варіант № 6

1.

$$u_{tt} - 4u_{xx} = (x-1)e^{2t}, \quad (x,t) \in Q := (0,2) \times (0,11],$$
$$u|_{x=0} = 3e^{2t}, \quad u_x|_{x=2} = 0, \quad t \in (0,11],$$
$$u|_{t=0} = \sin 2x, \quad u_t|_{t=0} = 1, \quad x \in [0,2].$$

2.

$$u_{tt} - 16(u_{xx} + u_{yy}) = y\cos 2t, \quad (x,y,t) \in Q := (0;2) \times (0;3) \times (0;14],$$
$$\begin{cases} u_x|_{x=0} = 0, \quad u|_{x=2} = 0, \quad (y,t) \in (0,3) \times (0,14], \\ u|_{y=0} = 0, \quad u_y|_{y=3} = 0, \quad (x,t) \in [0,2] \times (0,14], \end{cases}$$
$$u|_{t=0} = 3x, \quad u_t|_{t=0} = 7y, \quad (x,y) \in \overline{\Omega} := [0;2] \times [0;3].$$

Варіант № 7

1.

$$u_{tt} - 9u_{xx} = (x-1)e^{3t}, \quad (x,t) \in Q := (0;3) \times (0;10],$$
$$u_x|_{x=0} = 0, \quad u|_{x=3} = 2e^{3t}, \quad t \in (0;10],$$
$$u|_{t=0} = \cos 2x, \quad u_t|_{t=0} = 2, \quad x \in [0;3].$$

2.

$$u_{tt} - 25(u_{xx} + u_{yy}) = y\cos 2t, \quad (x,y,t) \in Q := (0;4) \times (0;3) \times (0;14],$$
$$\begin{cases} u|_{x=0} = 0, \quad u_x|_{x=4} = 0, \quad (y,t) \in (0;3) \times (0;14], \\ u_y|_{y=0} = 0, \quad u|_{y=3} = 0, \quad (x,t) \in [0;4] \times (0;14], \end{cases}$$
$$u|_{t=0} = 3y, \quad u_t|_{t=0} = 2x, \quad (x,y) \in \overline{\Omega} := [0;4] \times [0;3].$$

Варіант № 8

1.

$$u_{tt} - 16u_{xx} = (x-1)\sin 3t, \quad (x,t) \in Q := (0;3) \times (0;15],$$
$$u_x|_{x=0} = 0, \quad u|_{x=3} = 2\sin 3t, \quad t \in (0;15],$$
$$u|_{t=0} = 3, \quad u_t|_{t=0} = \cos 2x, \quad x \in [0;3].$$

2.

$$u_{tt} - 9(u_{xx} + u_{yy}) = ye^{2t}, \quad (x,y,t) \in Q := (0;6) \times (0;4) \times (0;14],$$
$$\begin{cases} u_x|_{x=0} = 0, \quad u|_{x=6} = 0, \quad (y,t) \in (0;4) \times (0;14], \\ u_y|_{y=0} = 0, \quad u|_{y=4} = 0, \quad (x,t) \in [0;6] \times (0;14], \end{cases}$$
$$u|_{t=0} = 3y + 2, \quad u_t|_{t=0} = 4x, \quad (x,y) \in \overline{\Omega} := [0;6] \times [0;4].$$

Варіант № 9

1.

$$u_{tt} - 4u_{xx} = 3x\cos 3t, \quad (x,t) \in Q := (0;4) \times (0;16],$$
$$u|_{x=0} = 0, \quad u|_{x=4} = 2\cos 3t, \quad t \in (0;16],$$
$$u|_{t=0} = 3, \quad u_t|_{t=0} = \sin 2x, \quad x \in [0;4].$$

2.

$$u_{tt} - 9(u_{xx} + u_{yy}) = ye^{4t}, \quad (x,y,t) \in Q := (0;3) \times (0;4) \times (0;15],$$
$$\begin{cases} u_x|_{x=0} = 0, \quad u|_{x=3} = 0, \quad (y,t) \in (0;4) \times (0;15], \\ u|_{y=0} = 0, \quad u|_{y=4} = 0, \quad (x,t) \in [0;3] \times (0;15], \end{cases}$$
$$u|_{t=0} = 3y, \quad u_t|_{t=0} = 4x, \quad (x,y) \in \overline{\Omega} := [0;3] \times [0;4].$$

Варіант № 10

1.

$$u_{tt} - 25u_{xx} = 5x\cos 4t, \quad (x,t) \in Q := (0;3) \times (0;16],$$
$$u|_{x=0} = 0, \quad u_x|_{x=3} = 2\cos 4t, \quad t \in (0;16],$$
$$u|_{t=0} = 3\sin 2x, \quad u_t|_{t=0} = 2, \quad x \in [0;3].$$

2.

$$u_{tt} - 9(u_{xx} + u_{yy}) = y\sin 4t, \quad (x,y,t) \in Q := (0;4) \times (0;4) \times (0;16],$$
$$\begin{cases} u|_{x=0} = 0, \quad u_x|_{x=4} = 0, \quad (y,t) \in (0;4) \times (0;16], \\ u|_{y=0} = 0, \quad u_y|_{y=4} = 0, \quad (x,t) \in [0;4] \times (0;16], \end{cases}$$
$$u|_{t=0} = 3y + 4, \quad u_t|_{t=0} = 2x, \quad (x,y) \in \overline{\Omega} := [0;4] \times [0;4].$$