

1. Qaysi masalaning turg'unligi buziladi?
Javob: Elliptik tipdagi tenglama uchun Koshi masalasini.

2. Puasson tenglamasini aniqlang.

Javob: $\sum_{i=1}^n \frac{\partial^2 u}{\partial x_i^2} = -f(x);$

3. Quyidagi

$$3u_{xx} + u_{xy} + u_{yy} + 2u_x + u_y - u = 0$$

tenglamaning tipi va tartibini aniqlang.

Javob: Elliptik tipga tegishli, tartibi ikkiga teng.

4. Quyidagi

$$u_{xx} + u_{xy} - 2u_{yy} - u_y + u_x - u = 0$$

tenglamaning tipi va tartibini aniqlang.

Javob: Giperbolik tipga tegishli, tartibi ikkiga teng.

5. $2u_{xx} + 5u_{xy} + 3u_{yy} = 0$ tenglamaning nechta haqiqiy xarakteristikasi mavjud?

Javob: 2 ta.

6. $u_{xx} + 2u_{xy} + u_{yy} = 0$ tenglamaning nechta haqiqiy xarakteristikasi mavjud?

Javob: 1 ta.

7. Quyidagi tenglamaning tipini aniqlang.

$$U_{xx} - 2U_{xy} + U_{yy} + \alpha U_x + \beta U_y + cU = 0$$

Javob: parabolik.

8. Quyidagi $3u_{xx} + 4u_{yy} + 4u_{xy} + e^{-x}u = 0$ tenglamaning tipi va tartibini aniqlang.

Javob: Elliptik tipga tegishli, tartibi ikkiga teng.

9.

$$a(x, y)u_{xx} + 2b(x, y)u_{xy} + c(x, y)u_{yy} = \dots$$

tenglamaning xarakteristik tenglamasi qaysi javobda to'g'ri ko'rsatilgan?

Javob:

$$a(x, y)dy^2 - 2b(x, y)dxdy + c(x, y)dx^2 = 0$$

10. Quyidagi $u_{xy} + u_y + u_x - 3x^2u_y = 0$

tenglamaning tipi va tartibini aniqlang.

Javob: Giperbolik tipga tegishli, tartibi ikkiga teng.

11. $2u_{xx} - 5u_{xy} + 3u_{yy} = 0$ tenglamaning xarakteristikalari qaysi javobda to'g'ri ko'rsatilgan?

$$x + y = \text{const}$$

Javob: $3x + 2y = \text{const}$

12. Quyidagi

$$u_{xx} + 3u_{xy} - u_{yy} + u_x + 2u - x^2y = 0$$

tenglamaning tipi va tartibini aniqlang.

Javob: Giperbolik tipga tegishli, tartibi ikkiga teng.

13. Laplas tenglamasi uchun korrekt qo'yilgan masalani aniqlang.

Javob: Dirixle masalasi

14. Ikki o'zgaruvchili ikkinchi tartibli

$$a_{11}(x, y)u_{xx} + 2a_{12}(x, y)u_{xy} + a_{22}(x, y)u_{yy} + \dots$$

differensial tenglamaning $a_{12}^2 - a_{11}a_{22} = 0$

bo'lsa, qaysi tipga tegishli bo'ladi?

Javob: Parabolik tipga.

15. Quyidagi

$$u_{xx} + 6u_{xy} + u_{yy} + u_x + u_y + 2u = 0$$

tenglamaning tipi va tartibini aniqlang.

Javob: Giperbolik tipga tegishli, tartibi ikkiga teng.

16. Quyidagi tenglamaning qaysi biri

Elliptik tipga tegishli va bir jinsli?

$$\textbf{Javob: } 4u_{xx} + 4u_{yy} + 4u_{zz} - u_y = 0$$

17. Quyidagi

$$3u_{xx} + 4u_{yy} + 4u_{xy} + 2u_z - u_y + xy = 0$$

tenglamaning tipi va tartibini aniqlang.

Javob: Elliptik tipga tegishli, tartibi ikkiga teng.

18. Agar $2 < x + y < 5$ bo'lsa, u holda ushbu

$$4U_{xx} - 2(x - y)U_{xy} + (1 - xy)U_{yy} = 0$$

tenglamaning tipini aniqlang.

Javob: giperbolik.

19. $u_{xx} - 2u_{xy} - 3u_{yy} + u = 0$ tenglama qaysi tipga tegishli?

Javob: giperbolik.

20. Quyidagi tenglamaning tipini aniqlang. $U_{xx} - 2xU_{xy} = 0$

Javob: aralash tip.

21. Agar $1 < x < 2$, $3 < y < 4$ bo'lsa, u holda ushbu

$$U_{xx} + y^2U_{yy} + 2yU_x - 3yU_y = 0$$

tenglamaning tipini aniqlang.

Javob: Elliptik.

$$\textbf{22. } u_{xx} - 4u_{xy} + u_{yy} - 2xyu_x + 3xu = 0$$

tenglamaning tipi va tartibini aniqlang.

Javob: Giperbolik tipga tegishli, tartibi ikkiga teng.

$$\textbf{23. } u_{xx} - 4u_{yy} = 0 \text{ tenglama}$$

xarakteristikalarini aniqlang.

Javob: $y + 2x = \text{const}$, $y - 2x = \text{const}$

24. Quyidagi $yu_{xx} + u_{yy} - u_x + u = 0$

tenglamaning tipini aniqlang.

Javob: Aralash tipga tegishli.