

## Задания для лабораторной работы № 3

### Варианты задания

Тестовые примеры

1)

$$f(x) = \sin \pi x, \quad g(x) = 0, \quad \varphi(t) = 0, \quad \psi(t) = 0.$$

$$u(x, t) = \sin \pi x \cos \pi t.$$

2)

$$f(x) = x(1 - x), \quad g(x) = 0, \quad \varphi(t) = 0, \quad \psi(t) = 0.$$

$$u(x, t) = \frac{8}{\pi^3} \sum_{n=0}^{\infty} \frac{1}{(2n+1)^3} \sin (2n+1)\pi x \cos (2n+1)\pi t.$$

В примере 2 решение  $u(x, t)$  вычисляется с точностью  $\varepsilon$  так: выбираем

$$k \geq \frac{1}{2} \left( \sqrt{\frac{2}{\pi^2 \varepsilon}} - 1 \right)$$

и

$$u(x, t) \approx \frac{8}{\pi^3} \sum_{n=0}^k \frac{1}{(2n+1)^3} \sin (2n+1)\pi x \cos (2n+1)\pi t.$$

Ошибка

$$\frac{8}{\pi^3} \sum_{n=k+1}^{\infty} \frac{1}{(2n+1)^3} \sin (2n+1)\pi x \cos (2n+1)\pi t \leq \varepsilon.$$

# Варианты задания

| N   | $f(x)$                  | $g(x)$               | $\varphi(t)$ | $\psi(t)$  |
|-----|-------------------------|----------------------|--------------|------------|
| 1.  | $x(x+1)$                | $\cos x$             | 0            | $2(t+1)$   |
| 2.  | $x \cos(\pi x)$         | $x(2-x)$             | $2t$         | -1         |
| 3.  | $\cos(\pi x/2)$         | $x^2$                | $1+2t$       | 0          |
| 4.  | $(x+0,5)(x-1)$          | $\sin(x+0,2)$        | $t-0,5$      | $3t$       |
| 5.  | $2x(x+1)+0,3$           | $2 \sin x$           | 0,3          | $4,3+t$    |
| 6.  | $(x+0,2) \sin(\pi x/2)$ | $1+x^2$              | 0            | $1,2(t+1)$ |
| 7.  | $x \sin \pi x$          | $(x+1)^2$            | $2t$         | 0          |
| 8.  | $3x(1-x)$               | $\cos(x+0,5)$        | $2t$         | 0          |
| 9.  | $x(2x-0,5)$             | $\cos 2x$            | $t^2$        | 1,5        |
| 10. | $(x+1) \sin \pi x$      | $x(x+1)$             | 0            | $0,5t$     |
| 11. | $(1-x) \cos(\pi x/2)$   | $2x+1$               | $2t+1$       | 0          |
| 12. | $0,5x(x+1)$             | $x \cos x$           | $2t^2$       | 1          |
| 13. | $0,5(x^2+1)$            | $x \sin 2x$          | $0,5+3t$     | 1          |
| 14. | $(x+1) \sin(\pi x/2)$   | $1-x^2$              | $0,5t$       | 2          |
| 15. | $x^2 \cos \pi x$        | $x^2-(x+1)$          | $0,5t$       | $t-1$      |
| 16. | $(1-x^2) \cos \pi x$    | $2x+0,6$             | $1+0,4t$     | 0          |
| 17. | $(x+0,5)^2$             | $(x+1) \sin x$       | $0,5(0,5+t)$ | 2,25       |
| 18. | $1,2x-x^2$              | $(x+0,6) \sin x$     | 0            | $0,2+0,5t$ |
| 19. | $(x+0,5)(x+1)$          | $\cos(x+0,5)$        | 0,5          | $3-2t$     |
| 20. | $0,5(x+1)^2$            | $(x+0,5) \cos \pi x$ | 0,5          | $2-3t$     |
| 21. | $(x+0,4) \sin \pi x$    | $(x+1)^2$            | $0,5t$       | 0          |
| 22. | $(2-x) \sin \pi x$      | $(x+0,6)^2$          | $0,5t$       | 0          |
| 23. | $x \cos(\pi x/2)$       | $2x^2$               | 0            | $t^2$      |
| 24. | $(x+0,4) \cos(\pi x/2)$ | $0,3(x^2+1)$         | 0,4          | $1,2t$     |
| 25. | $1+x-x^2$               | $2 \sin(x+0,4)$      | 1            | $(1+t)^2$  |
| 26. | $0,4(x+0,5)^2$          | $x \sin(x+0,6)$      | $0,1+0,5t$   | 0,9        |
| 27. | $(x^2+0,5) \cos \pi x$  | $(x+0,7)^2$          | 0,5          | $2t-1,5$   |
| 28. | $(x+2)(0,5x+1)$         | $2 \cos(x+\pi/6)$    | 2            | $4,5-3t$   |