**Tasks**

**Task 1**. **Ordinary differential equations.**

To solve the differential equation



with initial conditions



Table of parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **variant** | ***t*0** | ***a*** | ***b*** | ***c*** |
| 1 | 0 | 4 | 2 | -1 |
| 2 | 1 | -4 | 1 | -2 |
| 3 | -1 | 1/4 | -1 | 2 |
| 4 | 1 | 9 | 3 | 0 |
| 5 | 2 | 1 | 2 | 2 |
| 6 | 0 | -1/4 | 0 | -1 |
| 7 | -1 | -9 | -1 | -2 |
| 8 | -2 | -1 | 1 | 4 |
| 9 | 0 | 1/9 | -1 | 0 |
| 10 | 1 | -1/9 | 1 | -1 |

**Task**.

1. Find the general solution of the given Cauchy problem. This is  if *a=λ*2 and  if *a=-λ*2.
2. Using the initial conditions, find the constant *c*1 and *c*2.
3. Put these constant to the formula of the general solution.
4. Make sure that the result satisfies, in reality the given equations and initial conditions.
5. Ordinary differential equations.
6. Partial differential equations of the first order.
7. Reduction of equations to the canonical form.
8. Cauchy problem for the vibrating string equation.
9. Vibrating of string with fixed ends.
10. Vibrating of string with free ends.
11. Forced vibrations of the string.
12. Heat equation with known temperature at the boundary.
13. Heat equation with known heat flux through the boundary.
14. Heat equation in the presence of heat sources.
15. Variational method in mathematical physics problems.
16. Laplace equation in a circle.
17. Green function method mathematical physics problems.
18. Finite difference method for mathematical physics problems.
19. Inverse problems of mathematical physics.