**Partial differential equations**

**Homework**

**Task 12. Laplace equation in circle**

**Methodical instructions**

Consider the electrostatic field of the charged circle of the radium *a*. This phenomenon is described by the Laplace equation in the polar coordinates



with boundary condition

*u*(*a*,*ϕ*) = *f*(*ϕ*).

The problem is exterior.

**Table of parameters**

|  |  |  |
| --- | --- | --- |
| **variant** | ***a*** | ***f* (*ϕ*)** |
| 1 | 3 | cos *x* |
| 2 | 2 | -sin *x* |
| 3 | ½ | -sin 2*x* |

Task:

1. Find the solution of the problem.
2. Check that this is, in reality the solution.
3. Show the graph (potential at the different points of circle).
4. Give the physical interpretation of the results.