**Partial differential equations**

**Homework**

**Task 4. Travelling waves**

**Methodical instructions**

In Lecture 4, we considered the D'Alembert method for solving the string vibration equation for the unbounded string with given its initial form and initial velocity distribution.

We have the string vibration equation

*utt = uxx*, -∞ < *x* < ∞, *t* > 0

with initial conditions

*u*(*x*,0) = *ϕ*(*x*), *ut*(*x*,0) = 0.

The function *ϕ* is given here, see the following images:

  

Variant 1 Variant 2 Variant 3

**Actions**

It is necessary perform the following steps:

1. Write the complete problem statement.
2. Write the D'Alembert formula for the given case.
3. Show the graphs of travelling waves such that all possible forms of the string will be determined (for example of the lecture, we have 6 different forms).

Use the example from the lecture as the sample.