LECTURE 12

PARTIAL DIFFERENTIAL EQUATIONS *cont.*

Example from old exam (continuation of the previous lecture):

$$u_{xx} = u_{tt} - 4u, \quad 0 \le x \le \pi,\ t > 0;$$
$$u(0,t) = 0, u(0,\pi) = 0$$
$$u(x,0) = 0, \quad u_t(x,0) = \sin x + \sin 2x + \sin 3x$$

Heat equation

- Deriving 1D heat equation.
- Heat equation on a segment
  - Meaning of the boundary values
  - Separation of variables, step 1: two ordinary differential equations
  - Separation of variables, step 2: meeting boundary conditions ⇒ admissible values of the spectral parametra
  - Separation of variables: final solution
  - Discussion of the behavior of the solution
  - Insulated boundary conditions
  - *Example:* standard equation and $u(x,0) = 1 - x/\pi$ for $0 < x < \pi$.
  - Non-homogeneous boundary conditions.