PARTIAL DIFFERENTIAL EQUATIONS
MATH 5174

Textbook: Walter A. Strauss "Partial Differential Equations: An Introduction" (*2-nd edition*) John Wiley & Sons, Inc.

1.2 First order linear equations

2.1 The wave equation (in $d = 1$)
The general solution. Initial value problem.

2.2 Causuality and energry

2.3 The diffusion equation (in $d = 1$)
Maximum principle. Uniqueness. Stability.

2.4 Diffusion on the whole line

3.1 Diffusion on the half-line

3.2 Reflections of waves
The half-line. The finite interval.

3.3 Diffusion with a source
The whole line. The half-line.

3.4 Waves with a source (in $d = 1$)

3.5 Diffusion revisited ($d = 1$)

5.1 The coefficients (of the Fourier Series)

6.1 Laplace equation
Maximum principle. Uniqueness of the solution

6.2 Laplace equation in rectangles and cubes

6.3 Poisson's formula (in $d = 2$)
Mean value property. Maximum principle. Differentiability.

6.4 Laplace equation in different domains: circles, wedges...

7.1 Green's first identity (in $d = 3$)
Mean value property. Maximum principle. Uniqueness of the solution of Dirichlet's problem. Dirichlet principle.

7.2 Green's second identity (in $d = 3$)
Representation of a harmonic function in $d = 3$

7.3 Green's functions
Definition. Symmetry of the Green's function.

7.4 Half-space and sphere