

## Topics for final exam, MATH308 - Summer 2014

### 1. Chapter 6 (sections 6.3-6.6)

- (a) Step functions and DE with Discontinuous Forcing Functions (including how to find the Laplace transform for a piecewise continuous function (with the help of step functions, sections 6.3, 6.4) and for an impulse function (section 6.5)
- (b) How to use the convolution for finding inverse Laplace Transform and solution of IVP (section 6.6)

Note that, as in the midterm exam 2, the table of Laplace transform as in the page 317 of the textbook will be given but you have to be aware that before using the table you will have to make an appropriate work based on the techniques you learned. Also it is recommended to review Section 6.2: Solution of initial value problems that is reduced (via Laplace transform) to finding the inverse Laplace transform of rational functions with the help of partial fraction decomposition.

### 2. Chapter 7. The main points to know are:

- (a) how to transform a system of differential equations to a matrix form.
- (b) what is a fundamental set of solutions of a first order linear homogeneous system of differential equations and how to check that the given set of solutions is fundamental (section 7.4).
- (c) what are eigenvalues and eigenvectors of a given matrix and how to find them (section 7.3).
- (d) how to solve a system of differential equations and IVP<sup>1</sup> in the following cases:
  - i. distinct real eigenvalues (section 7.5);
  - ii. complex eigenvalues (section 7.6)
  - iii. repeated eigenvalues (section 7.8)
- (e) Non-homogeneous linear systems: method of variation of parameters (section 7.9)

---

<sup>1</sup>especially in the case  $n = 3$  you have to practice the Gauss elimination method.