

Scope of final exam

Ch.6, Sec 6.1, 6.2, 6.3, 6.4

Ch.7, Sec 7.2, 7.3, 7.4, 7.5

Ch.8, Sec 8.2.1, 8.2.3, 8.3, 8.4, 8.5, 8.6.1, 8.8, 8.9, 8.13

Ch. 9, Sec 9.2, 9.3, Slide set for BVP

Read the textbook.

Key sections/concepts/techniques (bold = most important)

Chapter 6

6.2 Using a finite difference scheme to calculate the derivatives

6.3 Using Taylor series expansion to derive finite difference formulas
Determination of the "order of truncation error"

6.4 Table 1; You should be able to derive any formula in the table using the technique in Sec 6.3

Chapter 7

7.2 Rectangle & Midpoint methods

7.3 Trapezoidal method

7.4 Simpson's methods (Simpsons' 1/3 and 3/8 methods)

7.5 Gauss quadrature

Chapter 8

8.1 The concept of explicit vs. implicit methods

8.2 Euler's explicit method, Euler's implicit method *Skip Sec 8.2.2*

8.3 Modified Euler's method (a version of the 2nd order Runge-Kutta method)

8.4 Midpoint method (another version of the 2nd order Runge-Kutta method)

8.5 Runge-Kutta Methods (focus on the classical 3rd and 4th order Runge-Kutta)

You do not need to know how to derive various versions of the R-K schemes but you need to know how to use them.

8.6 Multistep method *Skip Sec 8.6.2*

8.8 System of 1st-order ODEs

8.9 Higher-order initial value problems

An example is the last problem in HW5 - you should be able to solve it.

8.13 Numerical stability

Chapter 9

9.3 Finite difference method (direct matrix solution) for B.V.P.

*Also review the **slide set for B. V. P.***

Good news! All material related to Partial Differential Equation will be excluded from the final exam