

CSCE 221 — Data Structures and Algorithms

Notes taken by Lukas Zamora

Spring 2019

Arrays, Linked Lists, and Recursion

Conduction of Heat in a 1-Dimensional rod, boundary conditions, equilibrium temperature distribution, heat condition in 2 or 3 dimensions. [1,3]

Introduction to Analysis of Algorithms

Linearity, heat equation with zero temperatures at finite ends, orthogonality of functions, Laplace's equation; solutions and qualitative properties. [4]

Stacks and Queues

Statement of Convergence Theorem, Fourier cosine and sine series, term-by-term differentiation of Fourier series, term-by-term integration of Fourier series, complex form of Fourier series. [5]

Vectors, Lists, and Sequences

Vertically vibrating string, boundary conditions, vibrating string with fixed ends, vibrating membrane, reflection and refraction of electromagnetic and acoustic sound waves. [6]

Trees and Search Trees

Characteristics for first order wave equations, method of characteristics for first order PDEs, one-dimensional wave equation, a vibrating string of fixed length, many quasilinear PDEs, semi-infinite strings and reflections. [7,10]

Priority Queues, Heaps

Heat equation on an infinite domain, Fourier transform pair, inverse Fourier transform, convolution theorem. [8]

Dictionaries, Hashing

Green's functions for boundary value problems for ODEs, method of eigenvalue expansion, nonhomogeneous boundary conditions. [9]

Sorting, Sets and Selection

Green's functions for boundary value problems for ODEs, method of eigenvalue expansion, nonhomogeneous boundary conditions. [11]

Text Compression

Green's functions for boundary value problems for ODEs, method of eigenvalue expansion, nonhomogeneous boundary conditions. [12,4]

Graphs

Green's functions for boundary value problems for ODEs, method of eigenvalue expansion, nonhomogeneous boundary conditions. [13]

Contents

| | |
|----------------------------|----------|
| 1 The Heat Equation | 4 |
|----------------------------|----------|

1 The Heat Equation