Australian National University
Research School of Computer Science

Summary of COMP3600/COMP6466
(28 lectures)

1   Mathematical Tools

Introduction
Notations O, Ω, Θ, ω, and o
Bounding techniques
Techniques for solving recurrences

2   Basic Design methodologies

Divide & Conquer (quick sort, finding maximum & minimum values, the linear selection algorithm)
Dynamic programming (shortest and longest paths in DAGs, LCS, matrix chain multiplication, etc)
Greedy algorithms (Job scheduling, The Huffman algorithm)

3   Data Structures

Heaps and priority queues (the min-heap and the max-heap)
Hash tables (hash functions, open addressing)
Binary search trees (preorder, inorder, and post-order tree traversals)
Binary search tree maintenance (node insertions and deletions)
Red-black trees (node insertions/deletions)
Disjoint sets (linked lists and directed forest representations, heuristics)
Graph representation (the adjacency matrix or adjacency (linked) lists)
Graph search techniques: DFS and BFS (discovery/finish times, tree edges, forward/back/cross edges)
BFS technique applications (bipartite graph detections)
DFS technique application (topological sorting, strongly connected components)

4   Graph Algorithms

Minimum spanning tree algorithms (Generic algorithm, Prim's and Kruskal's algorithms)
Single-source shortest path algorithms (Dijkstra's algorithm and Bellman-Ford's algorithm,
and conditions of these algorithms applicability)
All-pairs shortest paths (matrix method, repeated squaring matrix method,
                                     Floyd-Wallshall algorithm, transitive closure)