

Math 1271/3071 Final Exam Info Sheet

The purpose of this handout is to help you study by listing the concepts, definitions, and results you will need to know for the final exam.

Final Exam Information. The final exam will be on Thursday, Dec. 6 from 9AM to 12PM. The exam will take place in **the GYM**. You will *not* be allowed to bring in any notes, use the text book, or use a calculator. You **MUST** bring your **Student Card**.

Material Covered. All the material discussed in class, unless stated otherwise, will appear on the final exam. For the material you need to know from Chapters 1 through 6, please see the review sheets for Midterms 1 and 2. For the material on Chapters 7 and 9, please see below for the breakdown of what you will need to know from each section.

Section 7.1 Know the terminology associated to graphs: directed graph, multigraph, edge, vertex, loops, subgraph. Know the special families of graphs, like complete graph, the complete bipartite graph, and how to construct the complement of a graph. Know what it means for a graph to be bipartite, connected, and know what we mean by connected components. Know how the degree of a vertex is defined, what it means for a graph to be regular, and know the Handshaking Theorem (Theorem 7.1). Know what it means for a sequence of integers to be graphical.

Section 7.2 Know how to determine if a graph has an Euler circuit or an Euler walk. Know how to compute the Eulerization of a graph.

Section 7.3 Know terms like walk, circuit, the length of a walk, a cycle, simple walk, and a path. Know what it means for a graph to be connected, and be able to determine the cut-edges and cut-vertices of a graph. Know how to compute $\kappa(G)$ and $\kappa'(G)$.

Section 7.4 Know how to compute the distance between any two vertices in a graph. Be able to compute the shortest distance between two vertices using Dijkstra's algorithm.

Section 7.5 Know what a tree and a rooted tree are. Be able to find spanning trees in a graph, and how to use Prim's algorithm to find the minimal spanning tree.

Section 7.6 Know what a Hamilton circuit and path are. Be able to determine if a graph has a Hamilton circuit/path. Know how to use Ore's theorem to determine if a graph has a Hamilton circuit/path.

Section 7.7 Know what the Traveling Salesman Problem is, and be able to use the nearest neighbour method to find an approximate solution to the Traveling Salesman Problem.

Section 9.1 Know what a prime number is and some of their properties. Be able to compute the GCD of two numbers using the Euclidean Algorithm.

Section 9.2 Know how to do computations using modular arithmetic. Be able to find the inverse of a number modulo an integer. Be able to use the Chinese Remainder Theorem to solve a system of congruences.

Section 9.3-9.5 I will be giving you a message that has been encrypted using the Vigenère method. You will be asked to decrypt the message. This is the only question that will come from these three sections.

The Weighting of the Exam. Please note that in calculating your final mark, I will be using the following scheme. I will calculate your mark in two ways: (1) The first way is the way described on the course handout, i.e., each midterm test will be worth 25% of your final mark,

and the final exam will be worth 40%. (2) The second way is to drop your lowest midterm, and add its weight to the final exam. So your final exam will be worth 65% of your mark. I will then take the highest number of the two methods.

Note. I will be out of town December 2-9. Another faculty member will be supervising my final exam. While I am away, I will be checking email if you have any questions.

Good luck! Adam VT