

Math 3V03 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.

Exam Information. The final exam will be on Friday, December 11, 2015 at 9:00AM. The final exam will be 2.5 hours in length. It will take place in

BURKE SCIENCE BUILDING 120.

You will *not* be allowed to bring in any notes, use the text book, or use a calculator. Please bring your **Student Card**.

Material Covered. All the material discussed in class may appear on the final exam. Please see the review sheets for Midterms 1 and 2 for what material to know from Chapters 1-6. Below, I have given a breakdown of what you will also need to know from Chapters 7-10. Note that when you are learning definitions, it is good to think of an example of a graph that satisfies that term, and a graph that does not satisfy that property.

Section 7.1. You should know how to use the spanning tree algorithm and the minimum-weight spanning tree of Kruskal.

Section 7.2. Know the terms matching, maximum matching, M -alternating path, M -augmenting path. Know how to use the Hungarian algorithm to find a maximal matching in a bipartite graph.

Section 7.3. There will be no questions based on this section.

Section 8.1. Know the terms planar graph, plane drawing, regions, and maximal planar. Know Euler's Polyhedral Formula. Know 8.1.3, and know some examples of non-planar graphs.

Section 8.2. Know the terms lune, map, normal map, colouring of a map. Know the statement of the Four Colour Theorem, and the two equivalent formulations (8.2.3, 8.2.5). Know how to find the dual of a map M .

Section 8.3. Know the statement of the five colour theorem, and understand the basic idea behind the proof.

Section 8.4. Be able to draw a planar graph using only straight lines (see 8.4.1). Know the terms coin graph and penny graph.

Section 9.1. Know what a subdivision is. Know the statement of Kuratowski's theorem. Know how to make a simple drawing of a graph. Know what the crossing number is.

Section 9.2. Know the definition for the thickness of a graph, and some of the bounds on this invariant (e.g., 9.2.1). Know what it means to split a vertex and to identify a vertex. Know what we mean by the splitting number of a graph. You do not need to know the formulas for the splitting or thickness number of the complete graph.

Section 9.3. Know what we mean by an m -pire map. Know 9.3.1 and 9.3.2.

Section 10.1. Know what we mean by a rotation ρ on a graph G , and know the notation $r(\rho)$. Know Theorem 10.1.2. Given a rotation, you should be able to find $r(\rho)$. Also, be familiar with the scheme notation introduced in this section.

Section 10.2. From this section, you only need to know how to define a planar graph using rotations.

Section 10.3. Know the two ways to define the genus of a graph. You do not need to know the formulas for the genus of the complete and complete bipartite graphs. Know Heawood's Theorem (10.3.7).

Format. The final will be out of 70 points. The first section (40 points) will focus more on computations and understanding definitions. The second section (30 points) will ask you to pick six questions from among ten. These will involve proofs. I have tried to pick a question related to each chapter. One of the ten questions will be picked from among 10.1.6, 10.1.8, or 10.2.7.

If you have questions, please feel free to email me. Good luck!