Math 105, Fall 2011
Final Exam (12/13/11)
Review Information

The final exam will be given on **Tuesday, December 13**, from **1:30–4:00 PM** in **Budig 120** (the regular lecture hall). Try to arrive early.

Exam Procedure: As always, sit in your **assigned seat**, and bring a **#2 pencil, a calculator, and your KU ID card.** Check your calculator batteries — unfortunately, we will not be able to loan calculators.

Emergencies: *If an emergency prevents you from attending the exam, let me know immediately by sending e-mail to* `math105-f11@math.ku.edu` *or* `jmartin@math.ku.edu`*, or by calling the Mathematics Department Office at (785) 864-3651. In general, I need to be informed of emergencies within 24 hours of the scheduled exam time, and you will need to provide documentation of the emergency.*

Coverage: The test will consist of approximately 55–60 multiple choice questions, covering topics from the entire semester. This is more or less chapters 1, 2, 3, 5, 6, 7, and 11 of Tannenbaum, plus the Mini-Excursion. Detailed information is below, including the sections of those chapters for which you re not responsible.

Studying: The best way to study is to do problems from the homework and practice tests. The exam problems will not necessarily resemble those problems word-for-word, but I am looking at the practice problems as I write the final exam, and will test the same ideas.

Help Room: The Help Room (Snow 151) will be open on Friday, Monday and Tuesday, according to the schedule on the back of this page (subject to last-minute changes).

Curve: At this point, I do not know whether the scores will need to be curved. I will determine final grades according to the policies announced on the syllabus and course website, and will post them on MML and Enroll & Pay as soon as possible.

Help Room Schedule, Pre-Exam

	Fri 12/9 (Stop Day)	**Mon 12/12**	**Tuesday 12/13**
9:00–10:00	Ganchimeg Jeremy	Jeremy	Jeremy
10:00–11:00	Ganchimeg Jeremy	Jeremy Tyrone	Jeremy Khoa
11:00–12:00	Ganchimeg Emily	Jeremy Tyrone	Jeremy Khoa
12:00–1:00	Ganchimeg Brendan	Khoa Tyrone	
1:00–2:00	Ganchimeg Brendan	Khoa Brock	**FINAL EXAM**
2:00–3:00	Emily Brendan	Khoa Brock	
3:00–4:00	Tyrone Brendan	Emily Brock	
4:00–5:00	Tyrone Brendan	Emily Brock	

** *You are not responsible for the topics listed "not covered on final exam".* **

Chapter 1 (Elections): 7–8 problems

- Understand key terms: "majority", "plurality", "fairness criterion"
- Understand how to read a preference schedule
- Be able to determine the winner from a preference schedule under each of the four voting systems we've studied, and to rank all candidates using an extended ranking method
- Understand the four fairness criteria we've studied, and know why each voting system does or not meet each criterion
- Know what Arrow's Theorem says
- *Not covered on final exam:* pp. 24–26 (recursive ranking methods)

Chapter 2 (Weighted Voting): 7–8 problems

- Understand key terms: "player", "weight", "quota", "coalition", "winning coalition", "losing coalition", "grand coalition", "sequential coalition"
- Understand the notation for a weighted voting system (WVS)
- Determine possible values for the quota in a WVS
- Be able to tell quickly whether a player in a WVS is a dictator or has veto power
- Be able to calculate the Banzhaf and Shapley-Shubik power indices of players in a WVS

Chapter 3 (Fair Division): 7–8 problems

- Understand key terms: "fair share"
- Understand the basic assumptions of fair-division methods (rationality, cooperation, privacy)
- Understand and be able to apply the Divider-Chooser Method, Lone-Divider Method, Method of Sealed Bids, and Method of Markers
- Know which fair-division methods are appropriate for which kinds of problems
- *Not covered on final exam:* §3.5 and §3.6 (lone-chooser and last-diminisher methods)

Chapter 5 (Graphs and Euler Circuits): 7–8 problems

- Understand key terms: "Euler circuit", "Euler path", "unicursal tracing", "graph", "edge", "vertex", "loop", "isolated vertex", "degree", "even vertex", "odd vertex", "connected component", "circuit", "path", "bridge"
- Be able to tell whether two figures represent the same graph
- Know how to tell whether a graph has an Euler circuit or Euler path
- Know the Handshaking Theorem (a.k.a. "Euler's Sum Of Degrees Theorem", p.180) and be able to apply it to answer questions about degrees of vertices
- Know how to use Fleury's Algorithm to find an Euler path or circuit
- *Not covered on final exam:* §5.7 (Eulerizing graphs)

Chapter 6 (Complete Graphs and Hamilton Circuits): 7–8 problems

- Understand key terms: "Hamilton circuit", "Hamilton path", "complete graph", "Traveling Salesman Problem [TSP]", "optimal", "efficient"
- Understand what a factorial is, and be able to do arithmetic with factorials
- Know how many edges and how many Hamilton circuits the complete graph K_N has
- Understand what the Brute-Force Method is for solving the TSP, and why it is inefficient
- Understand the Nearest-Neighbor, Repetitive Nearest-Neighbor, and Cheapest-Link methods for solving the TSP approximately

Chapter 7 (Trees and Spanning Trees): 7–8 problems

- Understand key terms: "tree", "subgraph", "spanning tree", "minimum spanning tree [MST]"
- Know how many edges are in each spanning tree of a given graph
- Know how to tell whether a graph is (a) a tree; (b) a spanning tree of another graph
- Know how to count the spanning trees of certain small graphs
- Know how to apply Kruskal's algorithm to find a MST
- *Not covered on final exam:* §7.4, §7.5 (shortest networks connecting points)

Mini-Excursion (Graph Coloring): 1–2 problems

- Understand key terms: "coloring", "chromatic number", "optimal coloring"
- Be able to determine an optimal coloring and the chromatic number of a given graph
- Know what the Four-Color Theorem says

Chapter 11 (Symmetry): 9–10 problems

- Understand key terms: "rigid motion", "symmetry", "reflection", "rotation", "translation", "glide reflection", "fixed point", "image", "proper/improper"
- Know the basic properties of the four kinds of symmetries
- Be able to determine the symmetry type of an object, and to tell whether two objects have the same symmetry type
- Be able to compose two symmetries and describe the composition