

# COMS 556      HOMEWORK 7

Due 2 March 2007      25 points

## For students electing to conduct a research project

Write a short research proposal. The proposal should contain a discussion of the goals and objectives of your project (i.e., an overview of *what* you intend to work on and why it is important), discussion on background and related work (with references), and an outline of specific activities (i.e., an overview of *how* you intend to do the work). When preparing future reports, the “goals” and “background” should remain the same (or be slightly expanded), while some of your “work to be done” items will be replaced with “completed work” discussions (with details about how the work was completed). For example:

### Project: analysis of absorbing CTMCs

1. Problem statement

For this project, I will investigate how to analyze an absorbing CTMC, based on knowledge that the CTMC eventually reaches a specific absorbing state  $a \in \mathcal{A}$ . This has important applications ...

2. Related work

(Brief literature review here)

3. Proposed activities

To address this problem, I will construct a new absorbing CTMC, conditioned on the fact that the original CTMC reaches absorbing state  $a$ . Specifically, I will:

- (a) Develop an algorithm to construct the initial distribution for the new absorbing CTMC.
- (b) Develop an algorithm to construct the infinitesimal generator matrix  $\mathbf{Q}$  for the new absorbing CTMC.
- (c) Implement these algorithms in my CTMC solver (i.e., extend work for homework 6).
- (d) Evaluate the performance of these algorithms on several examples.

Important due dates for research projects (page limits are guidelines):

**2 March** : Proposals due (3–6 pages)

**2 April** : Progress report due (6–12 pages)

**23 April** : Draft of final report due (10–15 pages)

**Final exam time slot** : Final report due (15–20 pages)

## For students electing to take the final exam

Via email or hardcopy, notify me that you choose to take the final exam. This will be an easy 25 points for you. The final exam will make up for that.