

STAT 313 - 11S1 (C) 15 points	Semester One 2011
<b>Computational Statistics Assignment Cover Sheet</b>	
Student ID # :	
Surname or Family Name :	
First Name or Names :	
Course Coordinator: Raazesh Sainudiin	

## STATEMENT REGARDING DISHONEST PRACTICE

(relating to work submitted for assessment)

The University has a clear interpretation of what constitutes dishonest practice as described in your Calendar. Dishonest practice includes the following:

1. **Plagiarism**, being the presentation of any material (text, data or figures, on any medium including computer files) from any other source without clear and proper acknowledgement of the source of that material. (Guidelines for appropriate acknowledgement will be provided with assignment handouts).
2. **Collusion**, being work performed in whole or in part in conjunction with another person or persons, but submitted as if it had been completed by the named author alone (or joint authors if a group item of work).
3. **Copying**, being the use of material (in any medium, including computer files) produced by another person or persons, with or without their knowledge and approval.
4. **Ghost writing**, being the use of another party (with or without any form of payment) to prepare all or part of an item of work submitted for assessment.

Under the University regulations, evidence of any of these or other forms of dishonest practice by any student(s) represents grounds for disciplinary action and may result in penalties ranging from denial of credit for the item of work in question to exclusion from the University.

- This interpretation of the dishonest practice of collusion is not intended to discourage students from having discussions with each other about how to approach a particular assigned task, and incorporating general ideas coming out of such discussions into their own individual submissions.

### DECLARATION:

In signing below, I confirm that I have read and fully understand the statement regarding dishonest practice, as detailed in the University Calendar and briefly outlined above, and hereby certify that this assignment submitted for assessment is entirely my own work.

Signed : .....

Date : .....

### ENQUIRIES

Raazesh Sainudiin (r.sainudiin@math.canterbury.ac.nz, phone x7691)  
Room 724 Erskine Building  
See Course Syllabus for other details.

# STAT 313 Assignment

Due: May. 03, 2011

This assignment makes 15% of your final grade. I will not grade work that is written or presented poorly.

**Exercise in Comprehension: The Ziggurat Method** [G. Marsaglia and W. W. Tsang, SIAM Journal of Scientific and Statistical Programming, volume 5, 1984] is a rejection sampler that can efficiently draw samples from the  $Z \sim \text{Normal}(0, 1)$  RV. The MATLAB function `randn` uses this method to produce samples from  $Z$ . See [http://www.mathworks.com/company/newsletters/news\\_notes/clevescorner/spring01\\_cleve.html](http://www.mathworks.com/company/newsletters/news_notes/clevescorner/spring01_cleve.html) or [http://en.wikipedia.org/wiki/Ziggurat\\_algorithm](http://en.wikipedia.org/wiki/Ziggurat_algorithm) for more details.

Read the paper by Marsaglia and Tsang from <http://www.jstatsoft.org/v05/i08/paper>. In about two to three pages demonstrate your understanding of the Ziggurat algorithm for generating samples from  $\text{Uniform}(0, 1)$  RV. You may demonstrate your comprehension of the algorithm in several ways, including but not limited to:

1. Precisely describe the algorithm in words, pseudo-code, pictures, and/or animations.
2. Write a MATLAB routine to generate samples using this method and compare it with MATLAB's `randn`.
3. Precisely describe the efficiency of the Algorithm.
4. Compare the efficiency of this method to other methods for simulating from the  $\text{Normal}(0, 1)$  we have learned in class (use `tic` and `toc` for timing operations in MATLAB or analyse these algorithms' time-complexity analytically as we did for others in class).
5. Feel free to focus on details like how does the algorithm produces samples from the  $\text{Normal}(0, 1)$  tail (you have to read another paper by Marsaglia cited in the Ziggurat paper for this problem).