STAT 5443: Homework 2

Due: 3rd March 2017

1. This homework has 2 problems and a total of 40 points.
2. Hand in your HW (including print outs of your source code) at the beginning of the class on 3rd March, 2017. Additionally source code (if any) should be emailed to `stat5443.fall@gmail.com` **before** the assignments are submitted in the class. No late submissions will be accepted!

Problem 1 ($10 \times 2 = 20$ **pt)** The function $p(x) = \sin(x)$ is a density for $x \in (0, \pi/2)$.

- Describe an inversion method to sample random variables with this density and write a short R program to implement it.
- Set up a rejection sampling method to sample from $p(x)$ using a trial density, g, that is the uniform density on the interval $(0, \pi/2)$.

Problem 2 (10+10 = 20 pts) Suppose you have a distribution with density:

$$p(x) = \lambda x^{-\lambda-1}$$

where $x \geq 1$, $\lambda \geq 2$.

- Write a one-line **function** in R based on the inversion method to generate $n = 100$ samples from the distribution where λ is an input the the function.
- What line could you type to estimate $\mathbb{E}(X^{2.736})$ if X has the distribution described above with $\lambda = 3$.