Homework 5

Summer 2016 - Stat 575

Due: June 21, 2016 (hard copy on class)

Instructions: Perform all your calculations on R and save all your codes on a script file with the appropriate labels and comments. Copy and paste all your codes and outputs to a word document. Copy and paste the plots whenever necessary. Use R Markdown if possible.

Part I. (12 pts) Do the following problems from the exercises in the textbook.

5.1, 5.9, 5.14

Part II (8 pts)

Estimate the multiple integral

$$V = \int_0^{\pi/4} \int_0^{\pi/4} x^2 y^2 \sin(x+y) \ln(x+y) dx dy$$

using the following methods:

1. Antithetic Variable approach: Notice the integrand is monotone increasing in x and y. Use $x = \pi u_1/4$ and $y = \pi u_2/4$.

2. Control Variate approach: Use the function $f(x,y) = x^2 y^2$ as control variate to "approximate" the integrand. Also, use `mean()` in R to estimate the mean of the control variate.