IE 525 MC HW3 Name______________________________ Score____________

Requirements

1. Credits are given to typed homework only.
2. Submit a word or pdf file on http://compass2g.illinois.edu before 1pm on Wednesday 3/2/2016. Append your codes. You homework must be finished independently. It will go through plagiarism screening.
3. Submit a hardcopy without codes at the beginning of the class on Wednesday 3/2/2016.

(20 points)

1. (5 points) Implement the uniform random variate generator in Fig. 2.3 on p.52 of the text. The seeds x10, x11, x12 should be between 1 and 2147483646, x20, x21, x22 should be between 1 and 2145483478. For an increasing sequence of sample sizes, estimate $E[U] = 1/2$ with Monte Carlo simulation using the new generator. Compare to the generator you have been using previously. For both methods, report your estimates, absolute errors, standard errors and total computational times.
2. (5 points) Implement algorithm Fig. 2.15 on p.70 of the text for computing the standard normal cdf. Use this to compute the Black Scholes price of a European put option with $S_0 = K = 100, T = 1/52, r = 0.5\%, q = 0, \sigma = 0.3$.
3. (10 points) Implement the acceptance-rejection method (p.26 of the lecture notes) and the inverse transform method (p.30 of the lecture notes) for simulating standard normal random variates. The inverse transform method uses algorithm Fig 2.13 on p.68 of the text plus one step of Newton-Raphson. For an increasing sequence of sample sizes, estimate the European put price in 2. Compare the Box-Muller, acceptance-rejection, and inverse transform methods. For each method, report your estimates, absolute errors, standard errors and total computational times. Which normal random variate generator is the most efficient?