**Home Work 3 - Revised**

**AGEC 643**

**Due November 8, 2017 by Noon**

1. Describe in detail one of the risk analysis examples described by Pouliquen in his book Risk Analysis in Project Appraisal.
2. Summarize Meyer’s article “Choice Among Distributions.”
3. What is the objective of Monte Carlo simulation? (HINT: read my book, Chapter 1.)
4. Explain the difference between SND and USD random values. Next use the data in HWK\_3.1\_2017.XLSX and simulate X using the Inverse Transform. You must program the inverse transform using Excel commands and you MAY NOT use the EMP function. Print the equations you programmed to simulate X, the summary statistics for the USD and the random variable plus a CDF of the simulated X variable all on one sheet.

5. Write in detail using matrix notation the procedure for simulating a multivariate mixed distribution for the three variables listed below. Next, use the data in HWK\_3.2\_2017.XLSX and simulate the multivariate distribution assuming that the three variables are distributed as indicated below.

X ~ Normal

Y ~ Empirical

Z ~ Beta

Print, NOT in expected value mode, all of the steps you used to estimate the parameters and simulate the variables plus the summary stats and ONE CDF with all three variables on the one chart. Use VFORMULA to show what each cell is doing and type in the model why you are performing each step.

6. Rank the two risky scenarios using subjective expected utility (SEU).

P(x1) U(X1) P(x2) U(x2)

.30 100 .25 -100

.30 150 .20 100

.30 200 .25 270

.10 300 .30 300

7. **Simulate the model in HWK\_3.3\_2017.xlsx** and rank the alternatives using SERF by hand using a negative exponential utility function. Use the =CERTEQ() Simetar function for 25 RACs from a low to high RACs of zero to a maximum based on the formula for an absolute risk aversion coefficient. Then develop the SERF chart for the table of CEs. You have to program SERF yourself.

Then run SERF to see if you answered the problem correctly.

Print the summary stats for the model and the model in expected value mode. Print all of your CE results and the SERF results.

8. Use HWK\_3.4\_2017.xlsx for this problem. You will be simulating X three times. To insure a fair comparison of the three versions of X use the same USD for each X you simulate.

1. Given X ~ Normal with historical mean of 10 and standard deviation of 3, simulate X two ways: NORM(10, 3) and NORM(20, 3) BUT with a constant coefficient of variation (CV) for the second version of X.

Prove how this formula will guarantee that the CV is equal to the historical CV.

1. Assume we want the CV for X to be twice as large as history, now simulate X as a

NORM(20, 3) BUT with a CV that is fifty percent larger than history.

Prove this formula will guarantee that the CV is two times larger than the historical CV.

Print the model you developed in expected value mode for this problem and the summary statistics for the simulation including the USD.

9. Simulate X assuming an uncertainty distribution described below:

5% chance of X being low with a range of (25, 50, 70)

4% chance of X being large with a range of (350, 400, 475)

Historical data for X are in HWK\_3.5\_2017.xlsx. Use these data to simulate X for the normal risk conditions.

Print the model you developed in expected value mode and the summary stats as well as a CDF and PDF of X.