AGEC 643
Homework 1
Due Sept. 22, 2017

Be sure to document all cells that you type, using the =VFORMULA() function. Do NOT print the actual simulated values, only print the summary statistics for simulated variables.

1. Use the data in HWK1_2017.XLSX, worksheet Data 1, and answer the steps below using <u>only</u> Simetar functions. Print the answers like an economist, i.e., minimize pages of paper.

   a. Calculate the summary statistics for all variables
   b. Estimate trend regressions (do not print the residuals)
   c. Forecast variables for 5 years using trend regression
   d. Calculate the correlation matrix for the variables (show 4 places to right of decimal)
   e. Calculate the covariance matrix for the variables
   f. Calculate the square root of the correlation matrix; call it R
   g. Transpose the R matrix
   h. Calculate the product of RR', check if it equals the original correlation matrix and print both matrices
   i. Sort the original yield data matrix on Barley yield from low to high, carrying along all the other columns
   j. Convert the original yield matrix (including the years) to a column vector (do not print the whole vector)
   k. Use the vector in step J and create a matrix of rank 15x9

2. Use the data in Worksheet Data 2.
   a. Graph the yield data against time on the X axis
   b. Make the data stationary with OLS
   c. Use the residuals from the regression and estimate the parameters for the parametric distributions included in UPES
   d. Add in an EMP simulation formula to simulate the residuals using the same USD as the other distributions
   e. Simulate all of the distributions and pick the best distribution using CDFDEV

   Print the following:

   1. Regression results without the residuals
   2. The parameter matrix from UPES and the cells you used to simulate the residuals for the alternative distributions
   3. The summary statistics for the simulated distributions
   4. The CDFDEV values for the simulated distributions

3. Simulate USDs using UNIFORM and RAND functions.

   a. 500 iterations

b. 1,000 iterations
c. 5,000 iterations

Print the following on <u>one</u> sheet of paper:

    1. Table of summary statistics for the 3 simulations
    2. 3 CDF charts of Uniform and RAND simulated USDs
    3. Does RAND ever perform better than UNIFORM?

4. I want you to experiment with SNDs and USDs.

    a. Create a column of values that follow the order of: $0.001, 0.01, 0.05, 0.10, ... 0.95,$ 0.999 in column A
    b. In column B, use the function =NORMS INV (column A values) to convert the USDs in A to SNDs
    c. In column C, use the function =NORMDIST (column B values) to convert the SNDs back to USDs

Print the three columns with labels.

5. Develop a simple simulation model to estimate the PDF and CDF of total net returns for a farm business. This is a simple example of what can be done easily with simulation. Assume it is a farm with three crops. Use the data in worksheet Data 3 to estimate the yield and price distributions. Simulate these random variables as Empirical (independent) percent deviates from trend. Forecast the prices and yields for 2018 using trend regression.

	X_1	X_2	X_3
Acres Planted to each Crop	25	50	40
Variable Cost/Yield Unit	.50	3.75	4.50
Fixed Cost ($/acre)	100.	90.	50.

KOVs:
Calculate total revenue
Calculate total costs
Calculate total net returns
Probability of net returns greater than zero

Simulate the model and report summary statistics for all stochastic variables and the KOVs. Print the Parameter estimation for the stochastic variables, summary statistics for the KOVs and random variables, CDF and PDF for the net returns. Print your model as well.