Instructions:
Be verbose. Explain clearly your reasoning, methods, and results in your written work. Write clear code that is well documented. With 99% certainty, you cannot write too many code comments.

Written answers are worth 8 points. Code is worth 2 points. 10 points total.

1. When finished, respond to the questions in Sakai as "done." We will record your grade there.
2. In your code repository, create a folder called "Week02."
3. In that folder, include
   a. a document (preferably a PDF) with your responses.
   b. Slides for presenting your results.
   c. All code
   d. A README file with instructions for us to run your code

Everything must be checked into your repository by 8am Friday 1/14. A pull will be done at that time. Documents and code checked in after the instructors pull will not be graded.

Data for problems can be found in CSV files with this document in the class repository.

Problem 1
The conditional expectation of the multivariate normal should be equal to the expected value from an OLS regression.

Use the data in problem1.csv to prove this empirically.

Bonus: +2 extra credit – prove mathematically that the expected value from both equations are the same.

Problem 2
Fit the data in problem2.csv using OLS and calculate the error vector. Look at its distribution. How well does it fit the assumption of normally distributed errors?

Fit the data using MLE given the assumption of normality. Then fit the MLE using the assumption of a T distribution of the errors. Which is the best fit?

What are the fitted parameters of each and how do they compare? What does this tell us about the breaking of the normality assumption in regards to expected values in this case?

Problem 3
Simulate AR(1) through AR(3) and MA(1) through MA(3) processes. Compare their ACF and PACF graphs. How do the graphs help us to identify the type and order of each process?