Homework 4. Tuesday, September 10. Due Wednesday, September 18.

Calculate and plot the impulse response functions for the model

$$
\begin{pmatrix} x_{1t} \\ x_{2t} \end{pmatrix} = \begin{pmatrix} u_{1t} \\ u_{2t} \end{pmatrix} + \begin{pmatrix} 1 & .5 \\ .3 & .2 \end{pmatrix} \begin{pmatrix} u_{1t-1} \\ u_{2t-1} \end{pmatrix} + \begin{pmatrix} 1 & 2 \\ 0 & .5 \end{pmatrix} \begin{pmatrix} u_{1t-2} \\ u_{2t-2} \end{pmatrix}
$$

where the error terms are independent. If the variance of u_1 is 1 and the variance of u_2 is 2, and u_1 and u_2 are independent calculate the variance decomposition for x_1.

b) Also, plot (I suggest using GAUSS or MATLAB) the impulse response functions for

$$
\begin{pmatrix} x_{1t} \\ x_{2t} \end{pmatrix} = \begin{pmatrix} .5 & 0 \\ .3 & .2 \end{pmatrix} \begin{pmatrix} x_{1t-1} \\ x_{2t-1} \end{pmatrix} + \begin{pmatrix} u_{1t} \\ u_{2t} \end{pmatrix}
$$

c. And calculate the variance decomposition (at different frequencies) for x_1 when

$$
\begin{pmatrix} x_{1t} \\ x_{2t} \end{pmatrix} = \begin{pmatrix} 1 & 0 \\ 1 & 2 \end{pmatrix} \begin{pmatrix} u_{1t} \\ u_{2t} \end{pmatrix} + \begin{pmatrix} 1 & .5 \\ .3 & .2 \end{pmatrix} \begin{pmatrix} u_{1t-1} \\ u_{2t-1} \end{pmatrix} + \begin{pmatrix} 1 & 2 \\ 0 & .5 \end{pmatrix} \begin{pmatrix} u_{1t-2} \\ u_{2t-2} \end{pmatrix}
$$

where u_1 and u_2 now are independent with variance 1.

2. Download data for aggregate U.S. investment, consumption, and GDP. Estimate a VAR model and test if investment Granger causes GDP. (Feel free to do the computer work in groups together, but write up your comments by yourself.)