1.

The goal of this exercise is to write a MATLAB function named "problem1.m" for analysis of dynamic systems G(s)=1/(s^2+3s+2). The script should perform the following tasks.

a) Create the transfer function model H(s), generate a pseudorandom binary signal input with a sample rate of 10 Hz and for a duration of 200 seconds. Simulate the response of the system to this input signal. Create a MATLAB figure and plot the input and output signals in two subplots. (**Hint** - you may call function tf to create the transfer function, idinput to generate signal input and lsim to simulate time response of dynamic system)

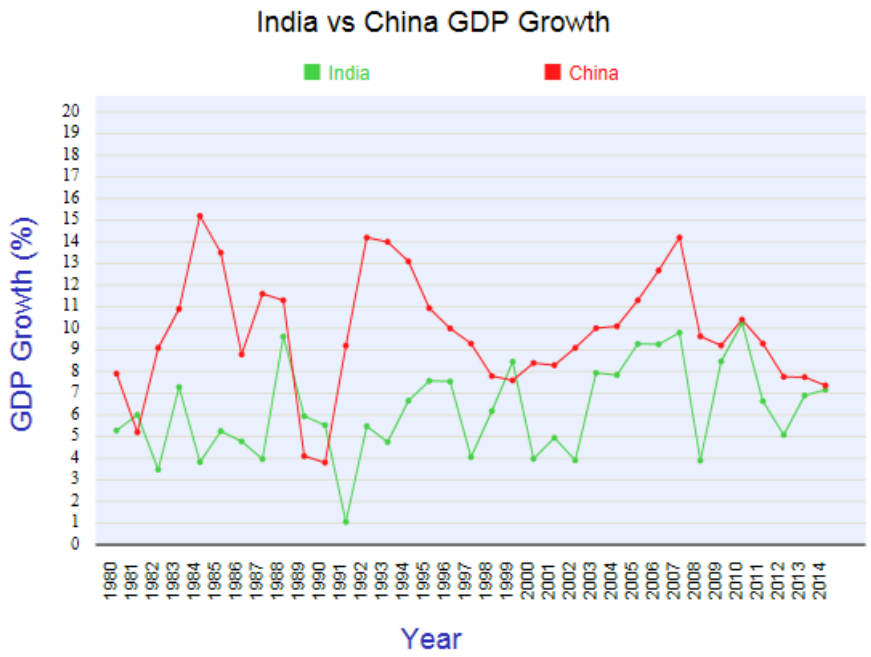
b) Calculate the autocorrelation of the computed output signal in part "a" to lag 200. Create a MATLAB figure and plot the autocorrelation signal. (**Hint** - you may call function xcorr to calculate autocorrelation)

c) Estimate the impulse response using correlation analysis for 10 seconds. Create a MATLAB figure and plot the estimated impulse response. In the same figure, plot the impulse response of the system (using the transfer function directly) for 10 seconds as well. Compare the plots. (**Hint** - you may call function cra and impulse for estimating impulse response)

d) Estimate frequency response of the system using spectral analysis. Moreover, estimate the transfer function with ETFE method. Generate a MATLAB figure and show the bode plots of both estimations in the same plot. (**Hint** - you may use etfe, spa for estimating frequency response)

2.

Figure 2 illustrates the GDP growth rate in India and China from 1980 to 2014. And the exact growth rate of India and China from 1980 to 2014 is also shown below.



Year	Chinese GDP	India GDP
1980	6.463001268	4.305147809
1981	3.833797117	3.578050295
1982	7.341931344	1.101034617
1983	9.245216354	4.83543596
1984	13.63833419	1.471102565
1985	11.9091084	2.90843419
1986	7.331332019	2.480293491
1987	9.912166139	1.723703014
1988	9.457901151	7.302963549
1989	2.600704109	3.736988483
1990	2.393612459	3.366900569
1991	7.81295779	-0.982546363

1992	12.82494547	3.390699613
1993	12.56602799	2.706142818
1994	11.78156869	4.604720942
1995	9.750279002	5.527286718
1996	8.782184882	5.526796934
1997	8.118548119	2.118629228
1998	6.80780632	4.243707664
1999	6.739270027	6.892479991
2000	7.640001656	2.015558933
2001	7.555801672	3.021236285
2002	8.401915061	2.05811615
2003	9.352364261	6.086693622
2004	9.45917505	6.187574525
2005	10.74255231	7.56712016
2006	12.09183627	7.584629578
2007	13.63634486	8.15356726
2008	9.093872102	2.375249298
2009	8.857029819	6.950038738
2010	10.10310072	8.763184414
2011	9.012854035	5.248536528
2012	7.332030984	4.134717786
2013	7.226936454	5.096691727
2014	6.755778416	6.234203582

Write a script called “problem2.m”. The script should perform the following tasks:

a) Form the data file “data1.mat” in v7.3 version. The first, second, and third column of data correspond to year, Chinese GDP growth, and Indian GDP growth, respectively.

b) Load the data file “data1.mat”. Analyze the GDP growth relationship between China and India quantitatively. Do you consider these parameters correlated or not? Discuss the method that you used in your analysis. Provide the required computations in your MATLAB script. (Hint - you may use xcorr, restrict the calculation to lags between -20 and 20, and normalize the result)

c) Estimate a first order polynomial model for predicting Indian GDP growth from the change in Chinese GDP growth. Plot the estimated function in part “b” on the scatter plot of data. Predict the Indian GDP growth in year 2015 assuming that the Chinese GDP growth was 6.36 %. (**Hint**: It is better to divide the given data to training and validation sets (75% of the data for training, and 25% for valication), and use polynomial estimation functions, “polyfit” and “polyval for estimating.)

What to return?

You are supposed to submit your assignment to the related link for assignment 4 in MyCourses. Your submission should include one zip file “Assign04_student number.zip” consisting of a pdf file “Assign04_student number.pdf”, and two MATLAB scripts “problem1.m”, “problem2.m” and “data1.mat”.

The hard deadline for submission of this assignment is 11.11.2018 at 23:55.