Texas Tech University

Department of Economics

Spring 2017

Eco 4306: Economic and Business Forecasting

Midterm 1

Name:

ID:

Short questions (45 points)

Q1. 7.5 points
Q2. 7.5 points
Q3. 7.5 points
Q4. 7.5 points
Q5. 7.5 points
Q6. 7.5 points

Applied problems (60 points)

Q7. 10 points
Q8. 10 points
Q9. 10 points
Q10. 10 points
Q11. 10 points
Q12. 10 points

Good luck!

Question 1 (7.5 points)

Explain the concepts of point forecast, interval forecast, density forecast.

Question 2 (7.5 points)

Give two examples of loss function, one symmetric, one asymmetric. Draw their graphs.

Question 3 (7.5 points)

Consider Fed forecasting inflation. Is it likely to have (1) a symmetric loss function, or (2) an asymmetric loss function with larger losses for negative forecast errors, or (3) an asymmetric loss function with larger losses for positive forecast errors? Explain.

Question 4 (7.5 points)

Define an AR(1) model (write its equation) and describe how its AC and PAC functions look like.
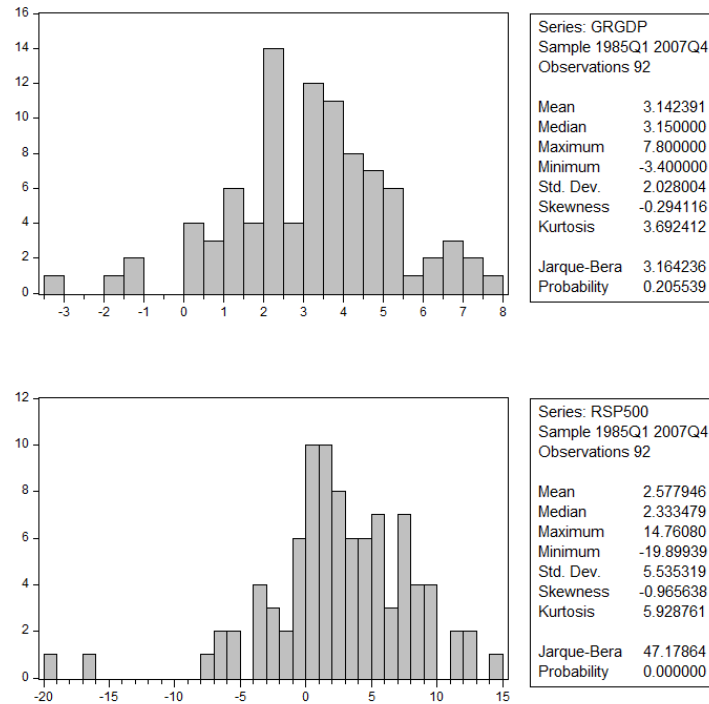
Question 5 (7.5 points)

Define an MA(2) model (write its equation) and describe how its AC and PAC functions look like.

Question 6 (7.5 points)

Define a pure seasonal S-AR(1) model (write its equation) and describe how its AC and PAC functions look like.
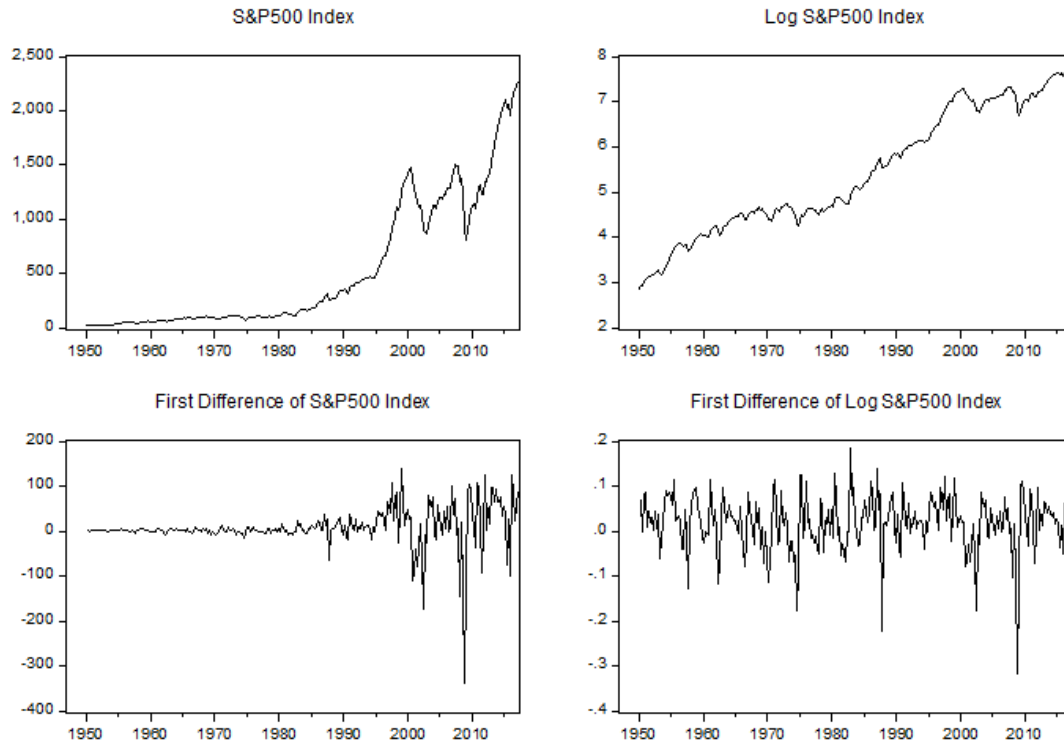
Question 7 (10 points)

Figure below shows the histograms for the real GDP growth rate and the quarterly return for S&P500 Index during the period 1985Q1-2007Q4. Is the GDP growth rate normally distributed in this sample? How about the returns for S&P500 Index?

Series: GRGDP	
Sample 1985Q1 2007Q4	
Observations 92	
Mean	3.142391
Median	3.150000
Maximum	7.800000
Minimum	-3.400000
Std. Dev.	2.028004
Skewness	-0.294116
Kurtosis	3.692412
Jarque-Bera	3.164236
Probability	0.205539

| Series: RSP500	
Sample 1985Q1 2007Q4	
Observations 92	
Mean	2.577946
Median	2.333479
Maximum	14.76080
Minimum	-19.89939
Std. Dev.	5.535319
Skewness	-0.965638
Kurtosis	5.928761
Jarque-Bera	47.17864
Probability	0.000000

Question 8 (10 points)

Figure below shows the time series for the S&P500 Index, the log transformed S&P500 Index, and also their first differences. Explain which of the four series are nonstationary, first order weakly stationary, second order weakly stationary.

Question 9 (10 points)

Figure below shows the time series for U.S. real GDP., `RGDP`, Index of Consumer Sentiment `CSENT`, U.S. unemployment rate. `UNRATE` and Employment (Total Nonfarm Payrolls) `PAYEMS`. Explain which of the four series are nonstationary, first order weakly stationary, second order weakly stationary.
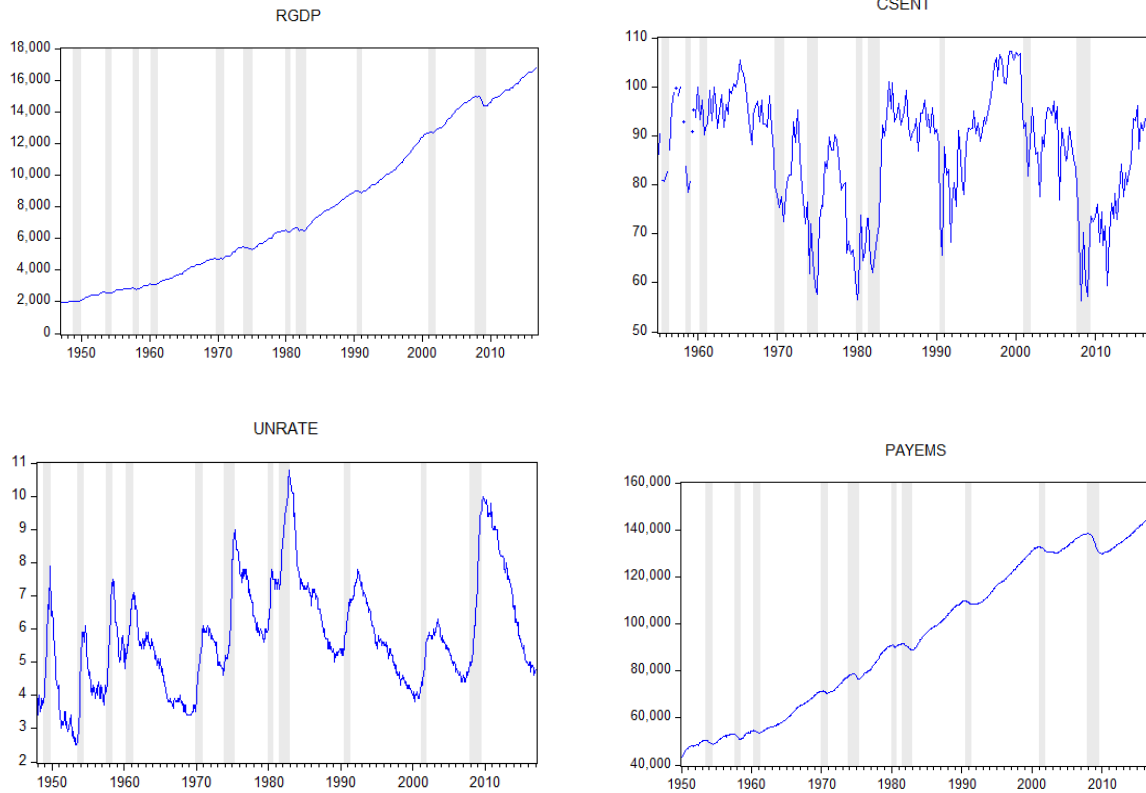
Question 10 (10 points)

Figure below shows the correlogram for the residuals from AR(2) and AR(4) models for the percentage change in the house price index in San Diego MSA. For a good model, the residuals should be white noise with no time dependence. Do the residuals from AR(2) and AR(4) model satisfy this property? Explain why yes or why no.

Date: 02/25/17 Time: 13:32
Sample: 1975Q1 2008Q3
Included observations: 134
residuals from AR(2) model

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	-0.060	-0.060	0.4987	
		2	-0.157	-0.162	3.9233	
		3	0.081	0.062	4.8320	0.028
		4	0.272	0.265	15.227	0.000
		5	-0.106	-0.053	16.821	0.001
		6	0.002	0.065	16.822	0.002
		7	0.161	0.116	20.544	0.001
		8	0.061	0.030	21.086	0.002
		9	-0.004	0.080	21.089	0.004
		10	-0.001	-0.028	21.089	0.007
		11	0.022	-0.047	21.158	0.012
		12	-0.054	-0.078	21.599	0.017
		13	0.005	-0.036	21.602	0.028
		14	-0.033	-0.068	21.765	0.040
		15	-0.074	-0.103	22.599	0.047
		16	-0.013	-0.024	22.625	0.067
		17	0.053	0.034	23.056	0.083
		18	-0.105	-0.070	24.778	0.074
		19	-0.182	-0.146	30.055	0.026
		20	0.092	0.063	31.394	0.026

Date: 02/25/17 Time: 13:31
Sample: 1975Q1 2008Q3
Included observations: 134
residuals from AR(4) model

| Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	0.032	0.032	0.1413	
		2	0.031	0.030	0.2749	
		3	0.034	0.032	0.4337	
		4	0.069	0.066	1.0957	
		5	-0.077	-0.083	1.9315	0.165
		6	0.036	0.036	2.1155	0.347
		7	0.149	0.149	5.2995	0.151
		8	0.043	0.032	5.5614	0.234
		9	0.046	0.044	5.8654	0.320
		10	-0.005	-0.031	5.8696	0.438
		11	0.002	-0.017	5.8700	0.555
		12	-0.078	-0.063	6.7815	0.560
		13	-0.021	-0.027	6.8510	0.653
		14	-0.038	-0.048	7.0708	0.719
		15	-0.041	-0.052	7.3252	0.772
		16	-0.023	-0.024	7.4099	0.829
		17	0.034	0.036	7.5912	0.869
		18	-0.078	-0.071	8.5350	0.860
		19	-0.161	-0.143	12.652	0.629
		20	0.052	0.077	13.079	0.667

Question 11 (10 points)

Consider the one quarter ahead Fed's forecast for inflation during the 1979Q4-1987Q3 period.

Suppose that we want to test whether the Fed's forecast are optimal under the symmetric quadratic loss function, which would imply that $E(y_{t+1}) = f_{t,1}$, and thus we perform an F-test for the joint hypothesis $H_0 : \beta_0 = 0, \beta_1 = 1$ in a regression $y_{t+1} = \beta_0 + \beta_1 f_{t,1} + \varepsilon_{t+1}$ where y_{t+1} is the actual inflation and $f_{t,1}$ is the Fed's 1-quarter-ahead forecast.

Interpret the results of this test below.

What can we say about Fed's loss function during 1979Q4-1987Q3 based on this test?

----- Actual Inflation Rate
—— One Quarter Ahead Inflation Rate Forecast
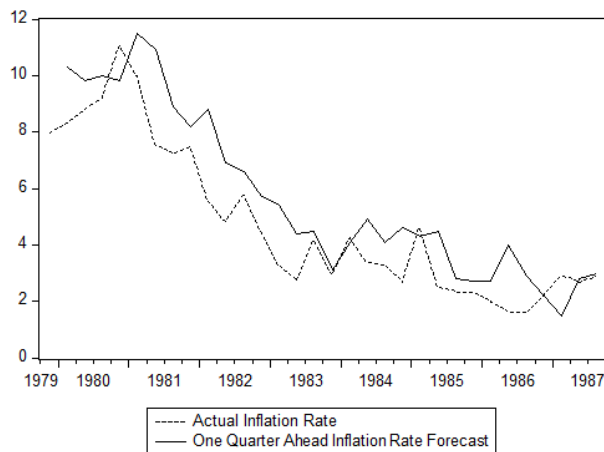
Wald Test:
Equation: EQ_GPGDP_F1

Test Statistic	Value	df	Probability
F-statistic	17.79592	(2, 29)	0.0000
Chi-square	35.59184	2	0.0000

Null Hypothesis: C(1)=0, C(2)=1
Null Hypothesis Summary:

Normalized Restriction (= 0)	Value	Std. Err.
C(1)	-0.117978	0.408818
-1 + C(2)	-0.158453	0.064037

Restrictions are linear in coefficients.

Question 12 (10 points)

Consider the data for monthly changes in U.S. residential construction for the period January 2002-January 2011 shown below. Discuss what kind of model would you would estimate for this time series, write its equation, and explain why you would choose this model.

Sample: 2002M01 2011M01
Included observations: 108

Autocorrelation	Partial Correlation		AC	PAC
		1	0.507	0.507
		2	0.260	0.004
		3	-0.009	-0.191
		4	-0.225	-0.209
		5	-0.357	-0.179
		6	-0.678	-0.571
		7	-0.365	0.263
		8	-0.258	-0.176
		9	-0.041	-0.010
		10	0.225	0.203
		11	0.453	0.326
		12	0.876	0.660
		13	0.446	-0.362
		14	0.228	-0.114
		15	-0.033	-0.115
		16	-0.215	0.098
		17	-0.327	0.138
		18	-0.627	0.100
		19	-0.341	-0.033
		20	-0.251	-0.015
		21	-0.046	-0.088
		22	0.198	-0.015
		23	0.412	0.066
		24	0.746	-0.160
		25	0.380	0.085
		26	0.187	-0.054
		27	-0.051	0.057