Problem Set #5
Spring 2017

1. If y_t is a quarterly seasonal time series, with the model

$$y_t = \sum_{i=1}^{4} \gamma_i D_{it} + e_t$$

where D_{1t}, D_{2it} are the dummies for the first quarter, second quarter, etc..The estimates are $\hat{\gamma}_1 = 0.5$, $\hat{\gamma}_2 = 0.8$, $\hat{\gamma}_3 = 0.2$ and $\hat{\gamma}_4 = 0.4$. Construct point forecasts for 2017Q1, Q2, Q3 and Q4.

2. Explain why the seasonal model

$$S_t = \sum_{i=1}^{4} \gamma_i D_{it}$$

is the same as

$$S_t = \alpha + \sum_{i=1}^{3} \beta_i D_{it}$$

3. The model is

$$y_t = \beta_0 + \beta_1 Time_t + \sum_{i=1}^{3} \gamma_i D_{it} + e_t$$

with estimates

$$\hat{\beta}_0 = 0.2$$
$$\hat{\beta}_1 = 0.01$$
$$\hat{\gamma}_1 = 0.5$$
$$\hat{\gamma}_2 = 0.8$$
$$\hat{\gamma}_3 = 0.2$$

The time index at the end of sample is $Time_n = n = 200$, and this final observation is the second quarter of 2016. What is your point forecast for 2016Q3 and 2016Q4?

4. In the January 2017 Employment Situation (released Feb 3), the Bureau of Labor Statistics reports that from December 2016 to January 2017 the seaonally unadjusted number of unemployed increased from 7,170,000 to 8,149,000, (about 1 million!) and the unemployment rate increased from 4.5% to 5.1%. Yet over the same period the reported seasonally adjusted number of unemployed increased only from 7,529,000 to 7,635,000 (about 100,000) and the seasonally adjusted unemployment rate increase from 4.7% to 4.8% (essentially constant). Are these numbers consistent? Was the BLS trying to trick the country about a hidden increase in unemployment? Explain.

5. The following FRED codes are for monthly U.S. unemployment rates, 1948m1 through current (2017m1), not seasonally adjusted, for individuals in the ages 20+ and the following categories

Men	LNU04000025
Women	LNU04000026
White Men	LNU04000028
White Women	LNU04000029
Black Men	LNU04000031
Black Women	LNU04000032

[The first three characters "LNU" are letters, the remainder are numbers.]

(a) Fit a simple seasonal dummy models for the two series "men" and "women". Plot fitted values for one year. It may be convenient to plot the two on the same graph, or you can plot them separately. These fitted values are the estimated seasonal patterns. Is the seasonality in unemployment rates the same for men and women, or are they different? What is different about the two patterns?

(b) Now fit simple seasonal dummy models for the four series "whitemen", "whitewomen", "black-men", and "blackwomen". Describe the similarities and differences between the estimated seasonal unemployment rate models for these four series.