SPSS Steps for Time Series Demo #2

1. Examine baseline:
   a. Data → Select Cases
      - Select: Based on time or case range
      - Range: Select the cases that represent the baseline. Because our intervention begins at case 29, we will select a case range beginning with case 1 and ending with case 28.
      - Click continue then ok
      - Data view should cross out all of the cases occurring after the beginning of the intervention

   b. Graphs → Chart Builder

      - Choose From: Scatter/Dot
      - Click on the first option and drag it up to the chart preview box
      - Drag the variable Year to the X-axis
      - Drag the variable InfantdeathMS to the Y-axis
      - Click ok and examine the graph output
      - Double Click the graph to edit it
      - Right click the graph and select: add interpolation line, delete scatter, and examine line

2. Difference Baseline:
   a. Transform → Create Time Series
      - Drag variable InfantdeathMS to the Variable->New Name box
      - Function: Difference (should already be selected)
      - Click Ok
      - Data view should now show the column for the differenced variable Infant_1
      - Create a new graph, replacing the InfantdeathMS Y-axis variable with the new differenced variable Infant_1
      - In some cases, differencing of the differenced column may be necessary, but this is rare and not necessary for our example
      - If variance is still a problem after differencing, a log transformation must be used
      - Find the largest negative number from the differenced column and add 1 to it for the next step

- Ex: Largest negative number for our selected cases is -729, so we would use [-730] for the next step

3. Log Transformation
   a. Transform →Compute Variable
      - Give transformed variable a new name, ex: Target Variable: LogInfant_1
      - Select Arithmetic in the Function Group Box
      - Select Lg10 from the Functions and Special Variables Box, and click the arrow to move it to the Numeric Expression Box
      - Select the differenced variable and move it to the Numeric Expression Box
      - The final equation should look like this: LG10(Infant_1+730)
      - Create a new graph, replacing the differenced Y-axis variable Infant_1 with the log transformation variable: LogInfant_1

4. Autocorrelations
   a. Analyze →Forecasting→Autocorrelations
      - Select LogInfant_1 and move it to the Variable Box
      - Click OK
      - None of the Autocorrelations should be significant, and the graphs should show that none of the cases pass the upper or lower confidence limits
      - If there are still significant autocorrelations, may need to difference again
      - Because nothing is significant, move on and ID the model based on patterns (see handout)
      - Based on the patterns seen in the ACFs and PACFs tables, we interpret this ARIMA as a (1,1,1) model. Once we have determined this, we have diagnosed the baseline and can now examine the predicted model based on the baseline

5. Forecasting
   a. Analyze →Forecasting→Create Models
      - Select the variable InfantdeathMS (the original variable before differencing and log transformation) and move it to the dependent variable box
      - Select the variable Year and move it to the independent variable box
      - Method: Select ARIMA
      - Click the criteria box and enter what model it is in the nonseasonal column ex: we previously determined our (p,d,q) to be (1,1,1)
      - Click continue and ok to view output

- Examine the Ljung-Box Q, it should not be significant
- If it is significant, you have not selected the correct ARIMA so try to determine a better model. If you still cannot determine the correct model based on patterns, try plugging in different ARIMAs such as (1,1,0) or (0,1,1) until the Ljung-Box Q is not significant
- Since our Ljung-Box Q is not significant ($p=0.255$) we know we have selected a good model

6. Determine if the intervention was significant
   a. Data →Select Cases
      - Select: All Cases
      - Click Ok

   b. Syntax
      - Type the variables of interest into the syntax ex: **Arima** InfantdeathMS With WWII
      - Type the model into the syntax ex: /model= (1 1 1) NOCONSTANT
      - The final syntax is seen in the Demo2 Syntax File
      - Highlight the entire syntax and hit play
      - The output gives us the Parameter Estimates box which shows us that both the (p) autoregressive component ($t= -4.33$, $p<0.001$) and (q) moving average component ($t= -2.87$, $p<0.01$) as well as the intervention ($t= -2.16$, $p<0.05$) are significant.