GOAL: Fit the best model to the data and use to forecast.

STEPS:

1. Account for any trend, seasonality, and changing variance from data
2. Find the best fit model for the data
3. Use the model to forecast future flight attendance
4. Test on obscured future data

TIMELINE

11/14 - Plot time series data, produce stationary series

* Plot and analyze the time series. Examine the main features of the graph, checking, in particular, whether there is (i) a trend; (ii) a seasonal component, (iii) any apparent sharp changes in behavior. Explain in detail.
* Use any necessary transformations to get a stationary series. Give a detailed explanation to justify your choice of a particular procedure. If you have used transformation, justify why. If you have used differencing, what lag did you use? Why? Is your series stationary now?

11/21 -

* Plot and analyze ACF and PACF to preliminary identify your model(s). Explain your choices of suitable p and q here.
* Fit your model(s): Estimate the coefficients and perform diagnostic checking. Compare at least two models to choose the final model and explain how you decided on your “best” model. Is the model obtained by using AIC(C) the same as one of the models suggested by ACF/PACF? Write the fitted model in algebraic form. Do you conclude from the analysis of residuals that your model is satisfactory?

11/28 - Forecasting

* Do forecasting. Make sure to include confidence intervals. Make sure to return to original data. Plot the original series and the forecasts.

11/30 - Finish report

12/02 - Finish powerpoint

12/04 - Turn in report

12/07 - Present project

Project Report. The project report should contain the following:

**1. Abstract or Executive summary** should be one–two short paragraphs summarizing briefly the questions you addressed, your time series techniques, key results, and conclusions.

**2. The main body of the report should cover the following:**

**Introduction.** Restate your problem, including details. Describe the data set and explain why this data set is interesting or important. Provide a clear description of the problem you plan to address using this dataset (for example to forecast) and include techniques you use. Describe results (positive and negative) and briefly state your conclusions. Please acknowledge the source of your data and software used.

**Sections.**

* 3. Conclusion Section. Reiterate your conclusions referring to the goals of your project. Were these goals achieved?
* Record the math formula for the model you chose. Acknowledge all individuals who helped you with this project.
* 4. References.
* 5. Appendix. Include your code with comments.

Preliminary Data Analysis

Our data for this time series analysis contains two variables: date in terms of months and the total number of international airline passengers for each month from January 1949 to December 1960. There are 144 total observations in our data, but we took out the year of 1960 (the last 12 observations), so we could compare it with our forecasted values.

From our time series plot below in Figure 1.1, we can see that there is an obvious upward trend in the data and also a seasonality component.

The seasonality component is shown by a spike in international airline passengers in the middle of each year, with a decrease in passengers in the beginning and end of each year. The seasonality plot is shown below in Figure 1.2 allowing a better view of the seasonality component.

# talk about seasonal plot

From our preliminary data analysis, there does not seem to be any apparent sharp changes in behavior. Mainly, we have a constant upward trend with a seasonality component.

#Add time series plot, and seasonal plot

# do we need decomposition plot?