**Directions:**

Q1 contains two data sets, which should have been provided by your recruiting contact. If you have not received them, please contact your recruiting contact immediately.

**Q1.** Demand forecasting is a critical component of revenue management in any airline. The Law of Demand states that for most goods, with a few exceptions (Giffen goods, Veblen goods, basic or necessary goods), demand is inversely related to price. If this relationship can be modelled accurately, an unbiased forecast of future demand is possible. However, the presence of multiple factors often makes the estimation process complicated. Here, you have been given a dataset (see the attached file: *demand\_data.csv*) containing ticket fares (in dollars), bookings, and travel season indicator (peak vs. off-peak season) information.

Based on this data set, build four statistical models, as given below, to capture the relationship between demand and price.

**Linear** *Bookings = α* + *β\*Fare*

**Power** *Bookings = αFareβ*

**Exponential** *Bookings = α exp(β\*Fare)*

**Quadratic** *Bookings = α* + *β\*Fare* + *γ\*Fare*2

Please evaluate the above four models, provide thorough discussion why you would or would not pick each of the suggested models, and make your final specification recommendation. Using the specification of your choice, please predict future demand for a given set of fares during peak and off-peak seasons (see the attached file: *predicted\_fare.csv*). Please provide your predictions in a table format, along with a graphical plot.

We would like you to focus on the following aspects of this model fitting exercise:

* Data exploratory analysis
* Model specification (including assumptions of the data generating process), model estimation, and inference
* Verification of model adequacy and distribution assumption, if any
* Discussion of your final model results
* Quantification of uncertainty associated with your prediction

Please clearly state all assumptions, describe your approach, and show the detailed steps in your analysis along with the equations, plots, and tables, as needed. In addition, please provide an interpretation of the model estimates quantifying the price sensitivity of demand. You may use any statistical language of your choice although preferred options are R, SAS, or Python. Please share the code used in your analysis.