Module 11 – EOQ

Exploratory Data Analysis

*In this section, you should perform some data analysis on the data provided to you. Please format your findings in a visually pleasing way and please be sure to include these cuts:*

* *Make line graphs showing the following data over time:*
  + *Sales*
  + *Unit Purchase Cost*
  + *Fixed Order Cost*
* *Use a forecast method to determine annual demand for 2025 to use for our model*
  + *Naïve*
  + *Moving Average / Weighted Moving Average*
  + *Linear Regression*
  + *Exponential Smoothing*
* *For costs, use a similar/different method. Otherwise, a simple overall average is fine.*

Model Formulation

*Write the formulation of the model into here prior to implementing it in your Excel model. Be explicit with the definition of the decision variables, objective function, and constraints. Please restate the variables in the algorithm (i.e. D = Annual Demand)*

Total Annual Cost=DC+D/Q\*S+Q/2\*CI

ORDER QUANITY>=1

Model Optimized for Minimizing Costs with Optimal Order Quantity

*Implement your formulation into Excel and be sure to make it neat. This section should include:*

* *A screenshot of your optimized final model (formatted nicely, of course)*
* *A screenshot of a spreadsheet

  AI-generated content may be incorrect.*
* *A text explanation of what your model is recommending*

the company should order about 727 items every time they need more inventory. That number helps keep costs as low as possible by finding a good balance between ordering too often and storing too many items. the company needs 18,471 items each year, each one costs $51.96, it costs $141.26 to place an order, and it costs 19% of the item price to store it for a year. If the company orders 727 items each time, they’ll need to order about 25 times a year. That makes the ordering cost about $3,588.82, and the holding cost about the same. The total cost of buying all the items for the year is $959,754.17.

* *Make a “sawtooth chart” for 2025, see below for reference. Assume you start with year with your EOQ Quantity like it has below*

*A graph with a line

AI-generated content may be incorrect.*

Model with Stipulation

*Please copy the tab of your original model before continuing with the next part to avoid messing up your original solution.*

*Implement the below EOQ extension, EOQ with planned backorders. We have added 2 new variables: A = shortage cost & b = planned back orders. Restate the previous variables with these new ones please. Note, you’ll need to solve for both Q\* and b\* here to get the optimal solution. You should start Q out as the EOQ from the previous section and b as 0. Also, note that this algorithm does not include `D \* C` as it’s not relevant to this analysis*

*A math equation with white letters

AI-generated content may be incorrect.*

*Lastly, do the following:*

* *Explain why you may include planned backorders (i.e. plan to accept purchases when out-of-stock such that some customers will wait for their purchase). Please think critically prior to doing any searches for why*
* *Make a similar “sawtooth chart” with the results here. Note, it will be very similar as before, but inventory will go below 0 before replenishing*