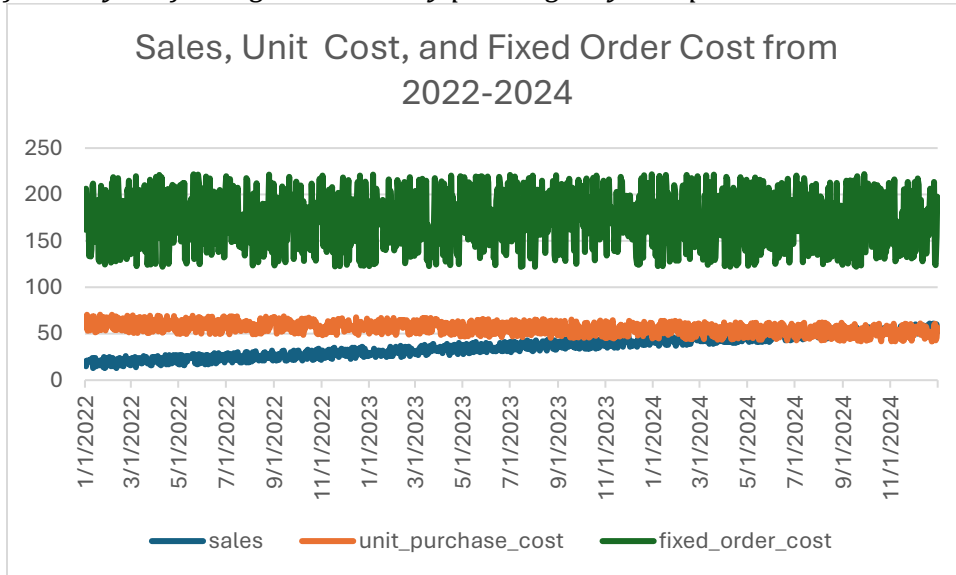


Module 11 – EOQ

Exploratory Data Analysis

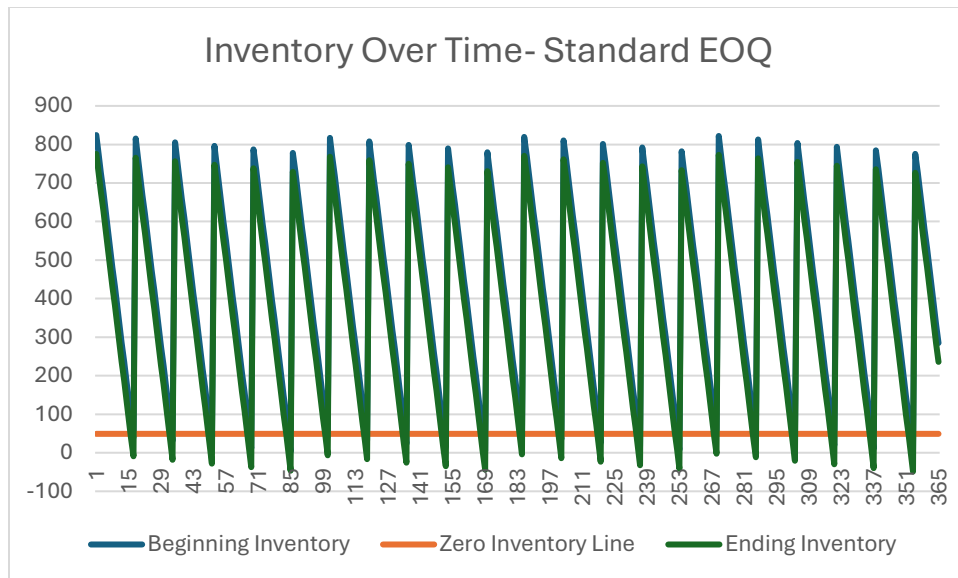
In this section, you should perform some data analysis on the data provided to you. Please format your findings in a visually pleasing way and please be sure to include these cuts:



Sales	Units
2022	8829
2023	13127
2024	17899
2025	17899

Naïve 1

Purchasing Cost	\$	946,738
Cost of Ordering	\$	3,706
Inventory Cost	\$	3,706
Total Cost	\$	954,150



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)

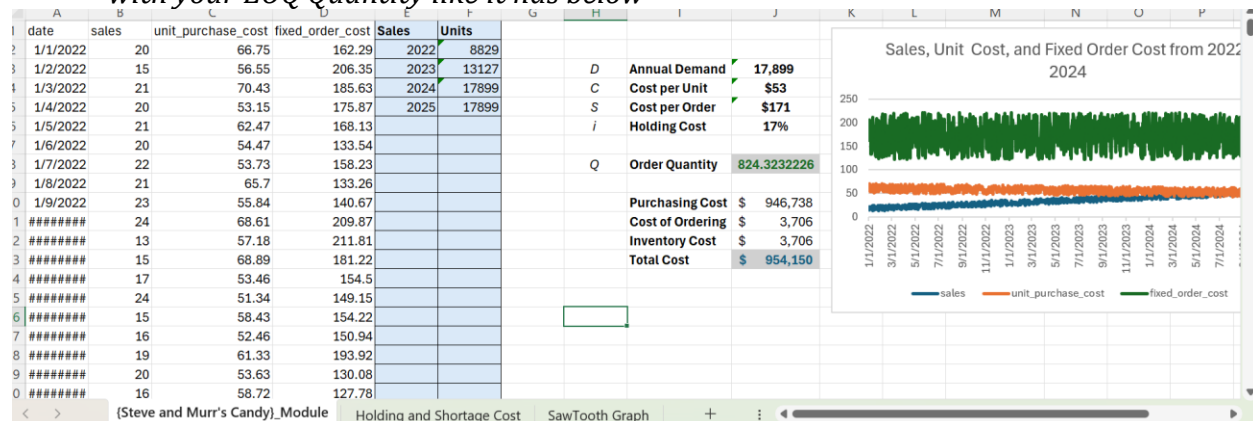
$$\text{MIN } DC + D/Q S + Q/2 C_i$$

$$Q \geq 1$$

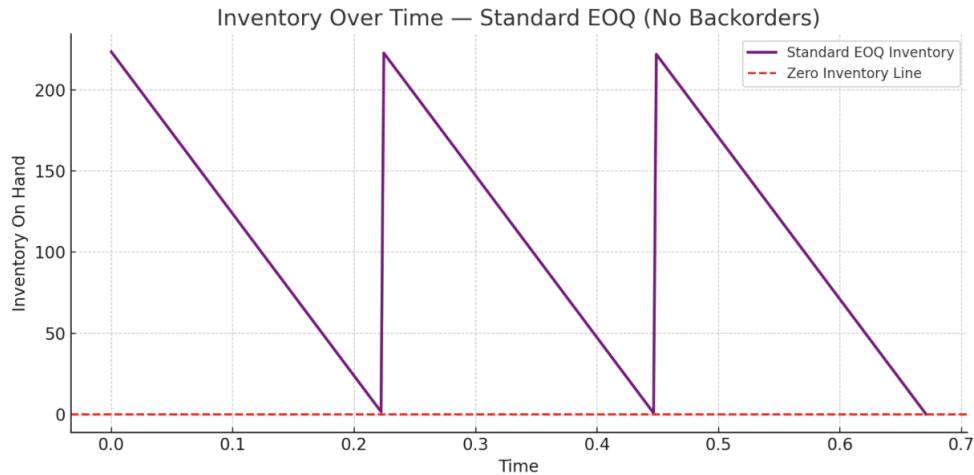
Model Optimized for Minimizing Costs with Optimal Order Quantity

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 text explanation of what your model is recommending
- Make a "sawtooth chart" for 2025, see below for reference. Assume you start with year with your EOQ Quantity like it has below



This model is recommending to order about 824 units in order to minimize total cost.



Model with Stipulation

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

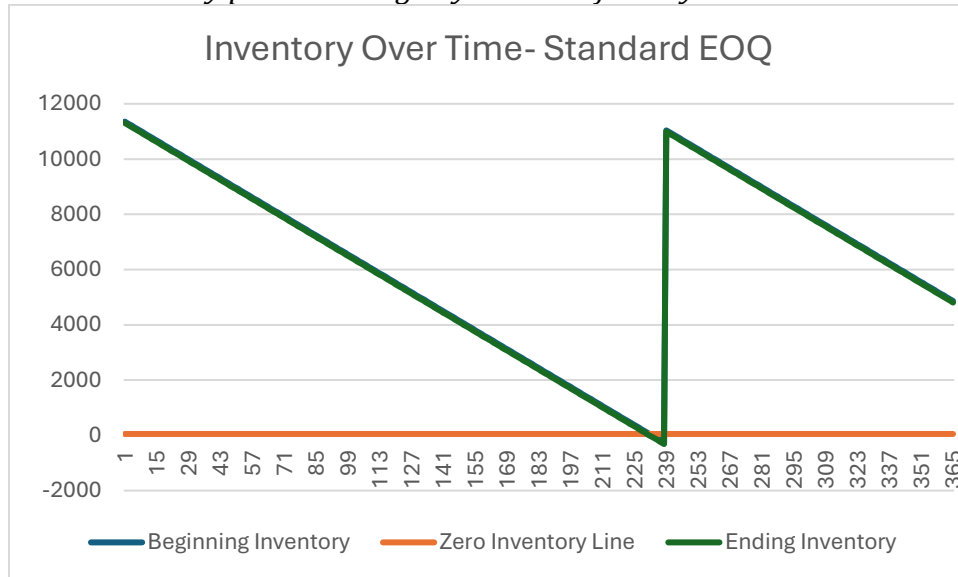
Implement the below EOQ extension, EOQ with planned backorders. We have added 2 new variables: A = shortage cost & b = planned back orders. Restate the previous variables with these new ones please. Note, you'll need to solve for both Q^* and b^* here to get the optimal solution. You should start Q out 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

D	Annual Demand	17,899	
C	Cost per Unit	\$52.89	
S	Cost per Order	\$170.68	
i	Holding Cost	17%	
a	Shortage Cost	21	
Q	Order Quantity	11355.72555	824.3232
b		11,295.97	
3rd	Planned Backorder	\$ 267.54	
	Cost of Ordering	\$ 269.03	
	Inventory Cost	\$ 1.41	
	Total Cost	\$ 537.98	

$$\text{Total Relevant Cost} = \frac{D}{Q}S + \frac{(Q - b)^2}{2Q}C_i + \frac{b^2}{2Q}A$$

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



You do this to keep customer satisfaction high because having planned backorders allow you to more quickly respond to sudden increase in demand.