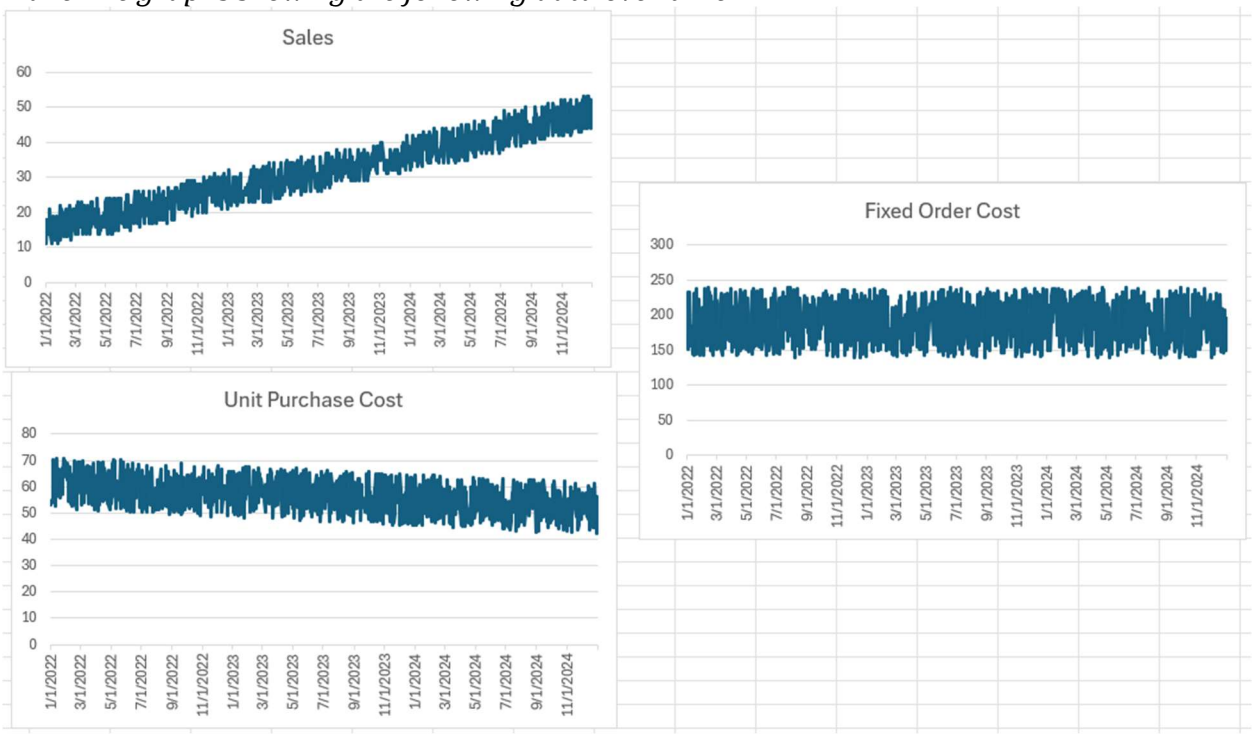
Module 11 – EOQ

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:*



- *Use a forecast method to determine annual demand for 2025 to use for our model*
    - *Moving Average / Weighted Moving Average*

N=(P1+P2+P3)/3 N=11,535

- *For costs, use a similar/different method. Otherwise, a simple overall average is fine.*

N=(P1+P2+P3)/3 N=56.66990876

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)

MIN: $DC + (D/Q)*S + (Q/2)*C_i$

Subject to:
Q>=1

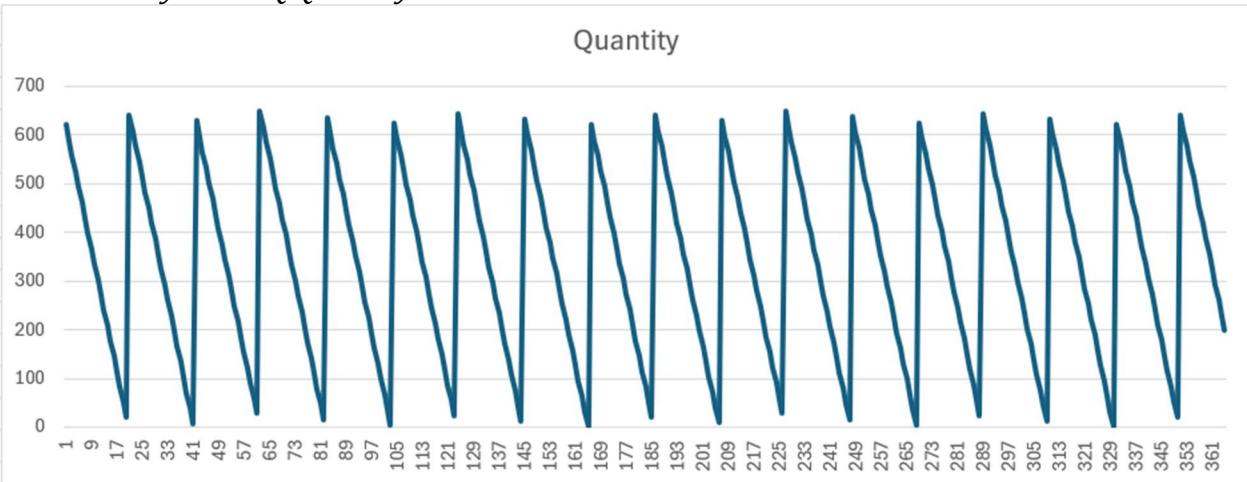
Model Optimized for Minimizing Costs with Optimal Order Quantity

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

D	**Annual Demand**	**11535**
C	**Cost per Unit**	**$57**
S	**Cost per Order**	**$189**
i	**Holding Cost**	**20%**
Q	**Order Quantity**	**620.2502229**
	Purchasing Cost	$653,677
	Cost of Ordering	$3,515
	Inventory Cost	$3,515
	Total Cost	**$660,707**

The model recommends that the optimal EOQ is 620 orders at a minimal cost of $660,707

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



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*

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

B	**Planned Backorder**	**241.4019242**
A	**Shortage Cost**	**24**
D	**Annual Demand**	**11535**
C	**Cost per Unit**	**$57**
S	**Cost per Order**	**$189**
i	**Holding Cost**	**20%**
Q	**Order Quantity**	**752.585429**
DC	**Purchasing Cost**	$653,677
*(D/Q)*S*	**Cost of Ordering**	$2,897
(Q/2)Ci	**Inventory Cost**	$4,265
	Total Cost	**$660,839**
(((Q-b)^2))/2Q)*Ci		$1,967.63
(b^2/2Q)A		$929
	Total Relevant Cost:	$5,793.66