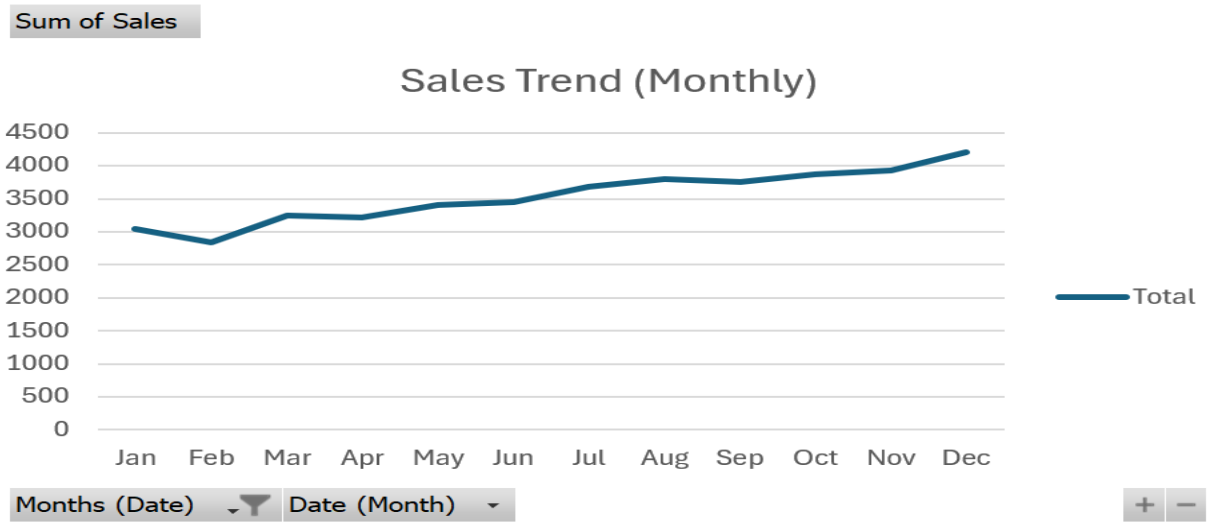
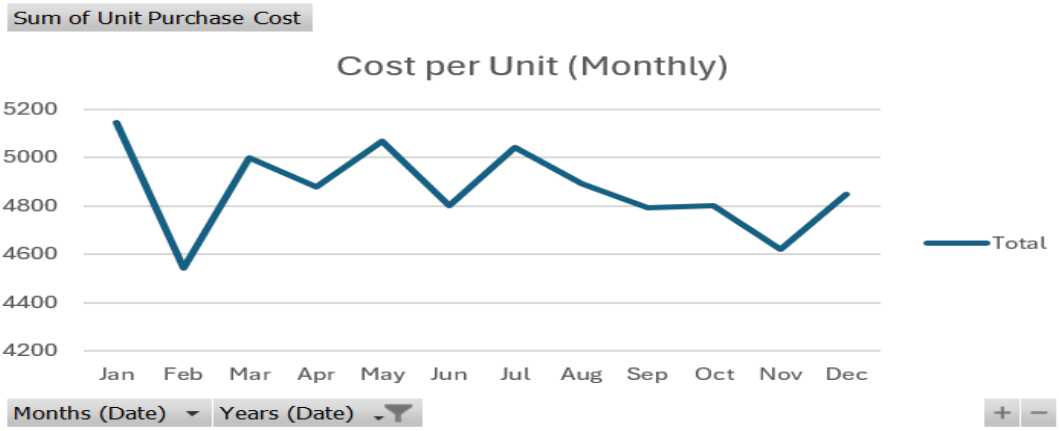
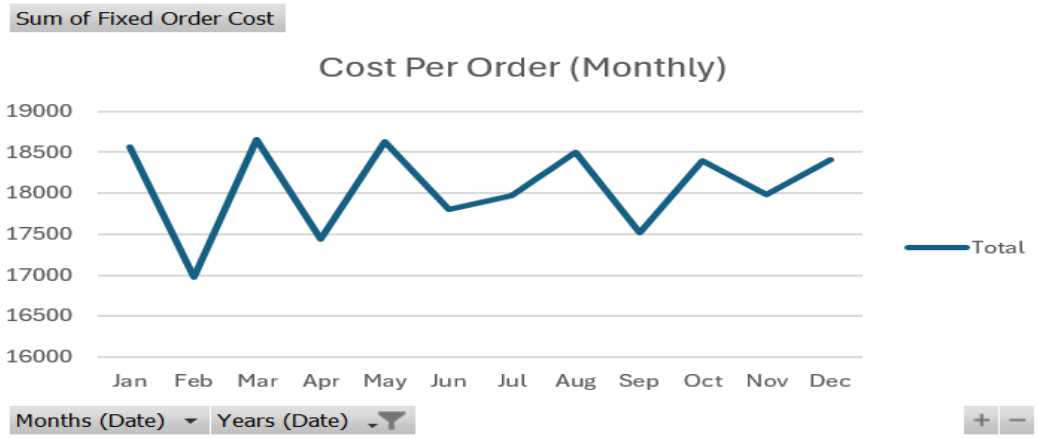
Module 11 – EOQ

Exploratory Data Analysis

- *Forecast method to determine annual demand for 2025 to use for the model*
  - *Naïve*







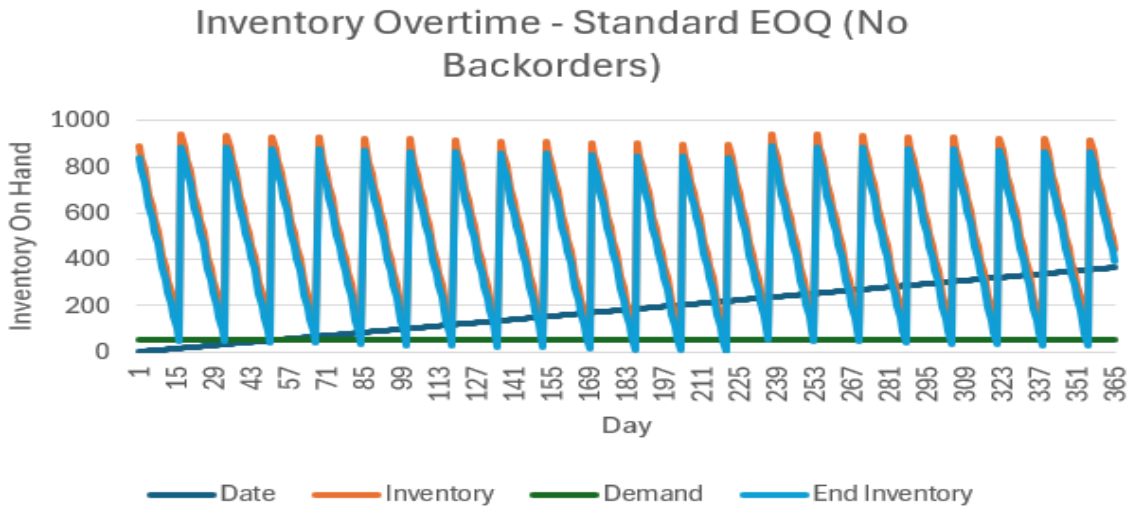
Model Formulation
MIN: DC + (D/Q)*S + (Q/2)*C

Subject To:
D = 19,190
C = $53
S = $198
i = 18%
Q = 890

Model Optimized for Minimizing Costs with Optimal Order Quantity

D	**Annual Demand**	**19,190**
C	**Cost per Unit**	**$53**
S	**Cost per Order**	**$198**
i	**Holding Cost**	**18%**
Q	**Order Quantity**	**890**
	Purchasing Cost	$1,023,020
	Cost of Ordering	$4,268
	Inventory Cost	$4,268
	Total Cost	**$1,031,556**

The following model recommends that to minimize total costs in the purchasing and sales of units between the Distribution Center, certain steps must be taken. Following the data listed above, they must order 890 units to replenish their inventory each time they are about to run out (or near 0). In doing so, they will optimize total costs by gaining the most efficiency out of the Inventory they can hold in stock. As a result, this considers each variable of the function (i.e. Annual Demand, Cost per Unit, Cost per Order, Holding Cost, & Order Quantity). Following this model, the business can prevent unnecessary spending on over-stocking or under-stocking the warehouse tied to operating a supply chain-based business.



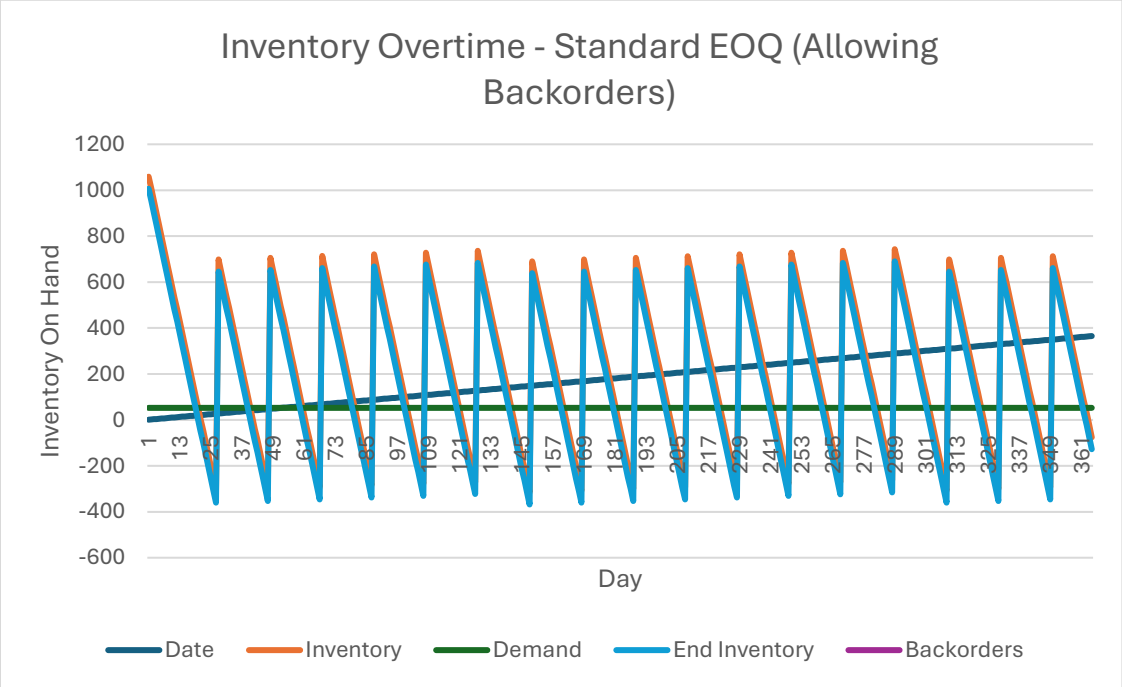
Model with Stipulation

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

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*
- *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*

D	**Annual Demand**	**19,190**
C	**Cost per Unit**	**$53**
S	**Cost per Order**	**$198**
i	**Holding Cost**	**18%**
b	**Planned Back orders**	**312**
Q	**Order Quantity**	**1059**
	Purchasing Cost	$3,585
	Cost of Ordering	$2,530
	Inventory Cost	$1,055
	Total Relevant Cost	**$7,171**
	Total Cost	**$1,030,191**



By including back orders, the business can fulfill future orders in a periodic manner. Thus, customer satisfaction will be maintained even if inventory is out of stock. As a result,

businesses can ensure that sales are not while customers are waiting or lost to competition. Through this principle, businesses can offer flexibility and reliability in knowing when they will periodically have shipment orders coming in. Additionally, it adds an element of efficiency to the inventory on hand but avoiding overstocking shelves or distribution centers. Thus, the amount of money spent on space occupied by the product(s) will be minimized. Furthermore, product demand can become easier to track. Thus, the practices of future forecasting and planning will be optimized. Overall, the inclusion of back orders provides operational flexibility. This is done through optimizing production scheduling and preventing rushed or disruptive adjustments in shipping practices to meet sudden demand spikes or valleys.