

Question 2: A retail chain has 100 stores in the Pacific Northwest. Consider the inventory of one particular SKU. The weekly demand at each store is Normally distributed with an average of 50 and standard deviation of 30. Assume the demand across the stores are independent of each other, and each store wants to achieve a 95% service level for this item.

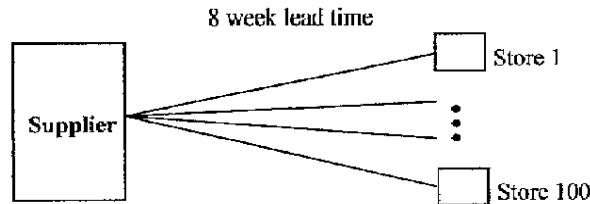


Figure 1: Direct from Supplier

In the current system (see Figure 1), each store orders directly from the outside supplier and receives shipments independently of the others. There is a constant 8-week lead time between the supplier and each store.

1. How much safety inventory is kept across all the retail stores?
2. Suppose the retail stores pay for the inventory upon ordering. How much pipeline inventory does the retail chain own?

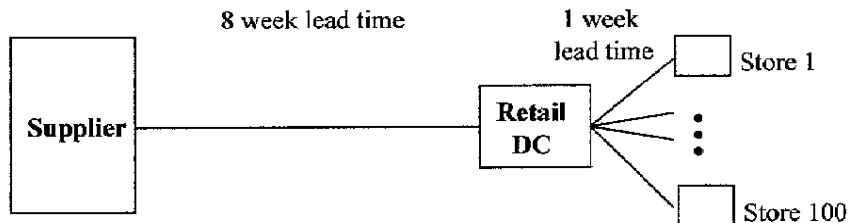


Figure 2: Centralized Inventory in a Distribution Center

In a consolidated distribution system (see Figure 2), the retail stores order from a distribution center (DC) owned by the retail chain. The retail chain in turn orders from the supplier. There is a 1-week leadtime between the stores and the DC, and an 8-week leadtime between the supplier and the DC.

3. The DC wants to achieve a 99.5% service level. How much safety inventory would it carry to achieve that? (Hint: Assume that the weekly demand at the DC is a simple sum of all the retail demands, which has an average of 5000 and standard deviation of 300.)
4. How much safety inventory do the retail stores carry now (still to achieve the 95% service level)? (Because the DC is so reliable, assume the 1-week leadtime is constant.)
5. How much pipeline inventory does the retail chain own (it continues to pay upon ordering)?
6. How much is the difference in total safety and pipeline inventory between the two setups?