Summary

- In many situations, suppliers give discount on bulk purchase. In such cases, the unit cost of inventory is not constant as it is dependent on number of items procured. By price discount, we mean that the suppliers provide inventory at price lower than the per unit price on single item purchase

- Price discounting may be an attractive strategy for both supplier and purchaser:
  - For supplier, the price discount encourages fast movement (or turnover) of inventory to next distribution channel. This, in turn, lowers the carrying cost of supplier
  - Availing price discount on bulk purchase may be an attractive strategy for buyer, as the offers for buyer should be decided after proper evaluation regarding trade-off between higher carrying cost and less unit price

- To increase sales, many companies offer quantity discounts to their customers. A quantity discount is simply a decreased unit cost for an item when it is purchased in larger quantities. It is not uncommon to have a discount schedule with several discounts for large orders. As always, management must decide when and how much to order but with quantity discounts, how does a manager make these decisions?

- As with other inventory models discussed so far, the overall objective is to minimize the total cost. Placing an order for that many units, however, might not minimize the total inventory cost. As the discount quantity goes up, the item cost goes down, but the carrying cost increases because the order sizes are large. Thus, the major trade-off when considering quantity discounts is between the reduced item cost and the increased carrying cost

- Recall that we computed the total cost (including the total purchase cost) for the EOQ model as follows:

  Total cost = Total ordering cost + Total carrying cost + Total purchase cost

- Quantity discounts are often offered for extremely purchased items in order to encourage buyers to purchase more units of an item. In such a situation, it is necessary to evaluate the economic trade-off between the savings in purchase cost and ordering cost and the increased cost of holding inventory

- Quantity discounts are usually offered in one of the following two ways:
  - All units quantity discounts
  - Incremental (or marginal unit) quantity discount

- Assumptions:
  - Is instantaneous Demand is known and constant
  - Shortage is allowed
  - Replenishment

- The models in this case will be different because the purchasing price (which is now variable) of inventory items is also included in the determination of total inventory cost. In this session we will discuss the calculation of the EOQ when price discounts are available, keeping total inventory cost to its minimum

- **Models with one-price break:**
  Suppose the following price discount schedule is quoted by a supplier in which a price break (quantity discount) occurs at quantity b1.
  The Algorithm
  Step 1: Consider the lowest price (that is C2) and determine Q2* by using the basic EOQ formula Q* is equal to square root of 2DC0 by (C2 into r). if Q2* lies in the prescribed range, b1 ≥Q2*, then Q2* is the EOQ that is Q8 is equal to Q2*. The optimal cost TC* associated with Q2* is calculated as follows: TC* (=TC2*) is equal to DC2 plus D/b1 into C0 plus b1 by 2 into (c2 into r).
  Step 2: if Q2* is not equal or more than b1, then calculate Q1* with price C1 and the corresponding total cost, TC at Q1*. Compare TC(b1) and TC(Q1*). If TC(b1) greater than TC(Q1*) then EOQ is Q* is equal to Q1*. Otherwise Q* is equal to b1 is the required EOQ

- **Model with Two-price breaks:**
  Suppose that the following price discounts schedule is quoted by a supplier, in which a price break (or quantity discount) occurs at quantity b1 and b2. This means the quantity is 0 less than equal to Q1 less than b1 the price per unit being C1, then we have the quantity b1 less than equal to Q2 less b2 the price being C2 and b2 less than equal to Q3 quantity with price per unit as C3. Notice that C3 is less than C2 is less than C1. The optimal quantity can be determined by the procedure given below:
  The Algorithm:
  Step 1:
  a) Consider the lowest price (that is C3) and determine Q3* by using the EOQ formula
  b) If Q3 is greater than equal to b2, then EOQ(Q*) is equal to Q3* and the optimal cost TC(Q3*) is the cost associated with Q3*
  c) If Q3* is less than b2, then go to step 2
  Step 2:
  a) Calculate Q2* based on price C2
  b) Compare Q2* with b1 and if b1 is less than equal to Q2* less than b2, then compare TC(Q2*) and TC(b2). But if TC (Q2*) is greater than equal to TC(b2), then EOQ is equal to b2. Otherwise EOQ is equal to Q2*
  c) If Q3* is less than b1 as well as b2, then go to step 3.
  Step 3:
  Calculate Q1* based on price C1 and compare, TC(b1), TC(b2) and TC(Q1*) to find EOQ. The quantity with the lowest cost will naturally be the required EOQ