Inventory

Single period problem with instantaneous demand

t is constant interval b/w order

Q is the stock for time t

r is the estimated demand at a discontinuous rate with probability P(r)

$$C_1 = holding\ cost$$

$$C_2 = shortage\ cost$$

The optimal value Q

$$\int_0^Q f(r)dr = \frac{C_2}{C_1+C_2}$$

Q1: a backing company sells cake by the kg. it makes a profit of 50 paisa a kg on every sold on the day it is backed. It disposes of all cakes not sold on the date it is backed at a loss of 12 paisa a kg. if demand is known to be rectangular b/w 2000 and 3000 kg. Determine the optimal daily amount backed.

Solution:

C1=0.12

C2=0.50

Demand r is rectangular b/w 2000 to 3000 kg means the distribution f(r) :

$$f(r) = \begin{cases} \frac{1}{b-a}, & a \le r \le b \\ 0, & otherwise \end{cases}$$

$$= \begin{cases} \frac{1}{3000-2000}, & 2000 \le r \le 3000 \\ 0, & otherwise \end{cases}$$

$$= \begin{cases} \frac{1}{1000}, & 2000 \le x \le 3000 \\ 0, & otherwise \end{cases}$$

$$\int_0^Q f(r)dr = \frac{C_2}{C_1+C_2}$$

$$\int_0^Q f(r)dr = \int_0^{2000} f(r)dr + \int_{2000}^Q f(r)dr$$

$$= 0 + \int_{2000}^Q \frac{1}{1000} dr = \frac{C_2}{C_1+C_2}$$

$$\left. \frac{r}{1000} \right|_{2000}^{Q} = \frac{0.50}{0.12 + 0.50}$$

$$\frac{Q}{1000} - \frac{2000}{1000} = \frac{0.50}{0.62}$$

Q-2000=806.45161

Q = 2806.45161 kg