Inventory RQ

adenadakuri

Example1 (RQ)

The annual demand for sugar at a local soft drink manufacturer is normally distributed with λ=800 tons and σ=25 tons. The delivery times for sugar is 5 working days.
We assume that there are 250 working days.

```
lambda11<-800#ton/year
sigma11<-25

leadTime11<- 5/250 #yr (tau)

#a)
demandTau11<-lambda11*leadTime11
sigmaTau11<-sigma11*sqrt(leadTime11)

safetyStock11<- 5#ton
Q11<-20 #ton

R11<-demandTau11+safetyStock11

#nivel de servicio
serviceLevel11<-pnorm(R11, demandTau11, sigmaTau11, TRUE) #Lo multiplico por el formato.
serviceLevel11
```

```
## [1] 0.9213504
```

```
#Tasa de resurtido (Fill rate)
z11<-(R11-demandTau11)/sigmaTau11
lostFunctionNormal<-function(x){exp(-(x^2)/2)/sqrt(2*pi)-x*(1-pnorm(x))}
lostFunctionValue11<-lostFunctionNormal(z11)

fillRate11<-1-(lostFunctionValue11*sigmaTau11/Q11)
fillRate11
```

```
## [1] 0.9937182
```

```
#b serviceLevel=95% ^ fillRate=95%

serviceLevel12<-0.95
safetyStock12<- qnorm(serviceLevel12)*sigmaTau11

fillRate12<-0.95
Lz12<-Q11*(1-fillRate12)/sigmaTau11

#USAR EL CODIGO DE LA TABLA DE MONCAYO
#z<-lossFunctionTable[rowZ,1]
#safetyStock3<-z*sigmaTau
```

El nivel de servicio que estamos dando es de 0.9213504

Example 3

Textiles RU's, a textile sizing and dyeing plant uses a continuous review system (R,Q) to manage its dye inventory. The ordering cost is $200, and a gallon of purple dye costs $5. Annual inventory holding cost is estimated at 20%. Expected annual demand is 10,000 gallons, and lead time demand is normally distributed with mean 400 and variance 900.

1. Find the lead time τ.

```
K<-200
c<-5
i<-0.2
h<-i*c

lambda<-10000
lambdaTau<-400
sigmaTau<-30

#1)
tau<-lambdaTau/lambda
```

Res. Tau= 0.04

2. Find the reorder point for a service level of 90%, and the resulting safety stock.

```
alfa21<-0.9 #service level
R21<-qnorm(alfa21,lambdaTau, sigmaTau)
safetyStock21<-R21-lambdaTau
```

Res. El punto de reorden es de 438.446547 galones. El safety stock resultante es de 38.446547

3. Because of delivery convenience, the order quantity is set as 1000 gallons. If the estimated shortage cost per gallon is $4, what is the reorder level that minimises the total expected cost?

```
Q23<-1000
pi<-4

R22<-qnorm(1-((Q23*h)/(pi*lambda)), lambdaTau, sigmaTau)
safetyStock22<-R22-lambdaTau
```

Res. El punto de reorden resultante es de 458.7989195, y el safety stock correspondiente es de 58.7989195

Example 3

Super-P is a peanut processing company. Past experience indicates that the annual demand is normally distributed with $\lambda = 25'000$ tons and a standard deviation of $\sigma = 36$ tons. To order the peanuts, the company spends $50 to process the order. Each ton of peanut costs $1'000, and the annual interest rate for evaluating inventory holding cost is 25 percent. The penalty for a shortage is estimated to be $4 per ton. Ordering lead time is approximately one week.

Calculate the R* and Q*

```
#El problema es que si no conozco Q, no puedo encontrar el punto de reorden
qOpt<-function(lambda, K, pi,nR, h){sqrt(2*lambda*(K+pi*nR)/h)}
rOpt<-function(Q, h, pi, lambda, lambdaTau, sigmaTau){qnorm(1-((Q*h)/(pi*lambda)),lambdaTau, sigmaTau)}
```

```r
lambda31<-25000
tau31<-1*(1/52) #por que nos lo dan por semana.
lambdaTau31<-lambda31*tau31

sigma31<-36
sigmaTau31<-sigma31*sqrt(tau31)

K31<-50
pi31<-4
c31<-1000
i31<-0.25

h3<-i31*c31

#Para j=0
nR3<-0
Q30<-qOpt(lambda31,K31,pi31, nR3, h3)
R30<-rOpt(Q30,h3,pi31,lambda31,lambdaTau31, sigmaTau31)
nR30<-lostFunctionNormal(1-((Q30*h3)/(pi31*lambda31)))*sigmaTau31
```