

**ENM320 PRODUCTION AND OPERATIONS PLANNING II**

**&**

**COMPUTER PROGRAMMING IV**

**MIDTERM REPORT**

**FALL 2024**

**GROUP**

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**Question:**

Harvey’s Specialty Shop sells a popular mustard. The mustard costs Harvey $20 a jar. Replenishment lead time is 4 months. Harvey uses a 25 percent annual interest rate and estimates the loss of goodwill cost as $20 per jar in case of stockout. Bookkeeping expenses for placing an order is $100. During the four-month replenishment period, Harvey estimates that he sells an average of 500 jars. and the standard deviation of demand is 100. Assume that demand is described by a normal distribution. How should Harvey control the replenishment of the mustard?

**Answer:**

**First iteration,**

• Since significantly differs from .

• Continue iterating by calculating ,

**Second iteration,**

• Since significantly differs from .

• Continue iterating by calculating ,

**Third iteration,**

• Since .

• Continue iterating by calculating ,

• Since , we can terminate the iterations. We conclude that the optimal values of Q and R are (Q, R) = (288, 668).

• Harveys should order 288 jars each time his inventory hits 668 jars.

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**Pseudocode**

function calculate\_optimal\_values(c, I, p, K, λ, μ, σ, max\_iterations, tolerance):

h = I \* c

Q0 = (2 \* K \* λ / h)^(1/2)

F\_R0 = 1 - (Q0 \* h)/(p \* λ)

z = calculate\_z(F\_R0)

prev\_R = μ + (σ \* z)

for iteration = 1 to max\_iterations:

Lz = find\_L(z)

R = μ + (σ \* z)

nR = σ \* Lz

Q = ((2 \* λ \* (K + (p \* nR))) / h)^(1/2)

F\_R = 1 - (Q \* h) / (p \* λ)

if abs(Q - Q0) or (R-prevR) < tolerance:

break

Q0 = Q

z = calculate\_z(μ + (σ \* z), μ, σ)

prev\_R=R

holding\_cost = h \* (Q / 2 + R - μ)

ordering\_cost = K \* λ / Q

penalty\_cost = p \* λ \* nR / Q

average\_time\_between\_orders = Q / λ

proportion\_no\_stock\_out = F\_R

proportion\_unmet\_demand = nR / Q

safety\_stock = R - μ

return Q, R, holding\_cost, ordering\_cost, penalty\_cost, average\_time\_between\_orders, proportion\_no\_stock\_out, proportion\_unmet\_demand, safety\_stock

metin, el yazısı, yazı tipi, kağıt içeren bir resim

Açıklama otomatik olarak oluşturuldu