HW 3 ANSWERS

1A)

1.We have identical 52 shipments.

$Q=\lambda/52$

AC(1)=(A+K)*52 if $k \geq \lambda/52$

AC(1)= (m1*A+K)*52 where m1= $\lfloor \lambda/52k \rfloor$ if $k < \lambda/52$

2.We have Q=C and $\lfloor \lambda/C \rfloor$ shipments.

AC(2)= (A+K)* $\lfloor \lambda/C \rfloor$ if k>= C

AC(2)= (m2*A+K)* $\lfloor \lambda/C \rfloor$ where m2 = $\lfloor C/k \rfloor$ if k< C

3. We have Q = 3C and $\lfloor \lambda/3C \rfloor$ shipments.

AC(3) =(A+K) * $\lfloor \lambda/3C \rfloor$ if k>= 3C

AC(3)= (m3*A+K)* $\lfloor \lambda/3C \rfloor$ where m3 = $\lfloor 3C/k \rfloor$ if k< 3C

1B)

λ = 720 units, ***K*** = \$160, ***A*** = \$300, ***C*** = 40 units; ***k*** can take two values - ***k*** = 120 or 25.

Policy 1: Q = 720/52 = 13.85

When k = 120 or 25, k > Q

AC(1)=(A+K)∗52= (300+160)∗52 = \$23920

Policy 2: k= 120 >= 40 = C

AC(2)= (A+K)$*$ $\lfloor \lambda / C \rfloor$ = (300+160)$*\lfloor 720/ 40 \rfloor$=\$8280

k = 25 < 40 = C

AC(2)= (m2$*$A+K)$*$ $\lfloor \lambda / C \rfloor$ = ($\lfloor 40/ 25 \rfloor *$300+160)$*$18=\$8280

Policy 3:

k = 120 = 3C = 120

AC(3) =(A+K) * $\lfloor \lambda/3\,C \rfloor$ = (300+160)* $\lfloor 720/120 \rfloor$=2760

k = 25 < 3C =120

AC(3) =(m3*A+K) * $\lfloor \lambda/3\,C \rfloor$ = (4*300+160)* $\lfloor 720/120 \rfloor$=8160

Policy 1 gives the worst cost for both k values and Policy 3 gives the minimum cost for both k values.

1C) Holding cost issue, storage space limitation can be problematic despite low annual costs of policies.

2) $\lambda = 20\ cars/day$ = 20* 360= 7200 cars/year

c = 1500 TL

h = 22 % * c = 330 TL/ unit/ year

K = 13000 TL

L = 20 days = 1/18 year

1 year = 360 days

2A) Q*= EOQ = $\sqrt{2K\lambda/h}$ = 753.18

2B) $\frac{K\lambda}{Q} + \frac{hQ}{2}$ = 248547.78 TL

2C) T = Q/ λ = 0.1 year or 36 days

2D) R = $\lambda * L$ = 20 cars/day * 20 days = 400 cars (Reorder point is the inventory level at which you will order so that new order arrives at the instant your inventory level goes to zero.

2E) Let x be the the first time the manufacturer should place an order to its engine supplier in Japan. I_0 = 1200, R = 400 and L = 20 days. Thus,

$\frac{x}{x+L} = \frac{I_{0-R}}{I_0}$, and x = 40^{th} day.

2F)

i) Due to the convexity of the average annual function, manufacturer would choose 75% of the quantity in 2A) = 753.18*0.75 = 564.89 = Q

ii) $\frac{K\lambda}{Q} + \frac{hQ}{2}$ = 258902.83 TL. Capacity constraint added 10355.05 TL to the annual cost.