Solutions to HW #6

1) $D = 3000/yr = 250/month$

$K = \$150/order$

$h = \$.75/unit/month$

$S = \$2/unit/month$

$$EOQ = \sqrt{\frac{2 \cdot 150 \cdot 250}{0.75} \cdot \frac{2+0.75}{2}} = 370.8$$

$$S = EOQ \frac{h}{S+h} = 370.8 \cdot \frac{.75}{2.75} = 101.12$$

$$N = \frac{250}{370.8} = 0.67 \text{ times/month}$$

$$T = \frac{1}{0.67} = 1.49 \text{ month or } 44 \text{ days}$$

$$TC = K \cdot \frac{D}{Q} + \frac{(Q-S)^2}{2Q} \cdot h + \frac{S^2}{2Q} \cdot b = 150 \cdot \frac{3000}{370.8} + \frac{259.68^2}{2 \cdot 370.8} \cdot .75 + \frac{101.12^2}{2 \cdot 370.8} \cdot 2$$

$$= 1332.09 \$/yr.$$

2) If he only keeps track of number of sales, he has no way to accurately estimate the demand, since demand = sales + lost sale. He would need some way to estimate the lost sales. One method would be to increase his supply for a period of time so that he would be able to meet all demand.

3) a) Newsboy problem is appropriate since:

- demand is uncertain with a probability distribution
- problem covers single period

b) C : purchase cost $28.5/unit

p: selling price , $150 /unit

s: salvage price , $20/unit

h: inventory holding, $.4/$ tied up = $28.5 \times 0.4 = 11.4$

C_o : $C - S + h = \$19.9$/unit

C_u : $p - c = \$121.5$/unit

→ For $D \sim U(50, 250)$

$$F(Q^*) = \frac{C_u}{C_o + C_u} = \frac{121.5}{121.5 + 19.9} = .86$$

For uniform distribution $U(a,b)$

$F(x) = y$ (where $0 \le y \le 1$)

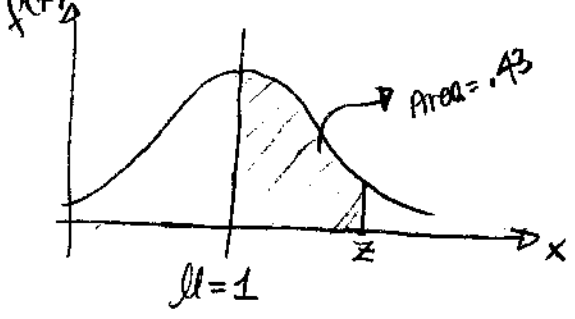
$\Rightarrow F^{-1}(y) = x \Rightarrow x = a + (b-a)y$

For this problem

$F^{-1}(0.93) = 50 + (250 - 50) \cdot 0.86 = 222$

)

For $D \sim N(150, 20^2)$



Use table A-1 (pg 772), find the z value corresponding to $.86 - 5 = 0.86$

$z \simeq 1.08$

$Q^* = \mu + \sigma z = 150 + 20 \cdot (1.08)$

$= 171.6$

d) Type of probability distribution function and variances

Variance of $U[50, 250] = \frac{(250-50)^2}{12} = 3333.33$

Variance of $N(50, 20^2) = 20^2 = 400$

Since variance of uniform is much bigger, the resulting Q^* has deviated much more from the mean.