Question 2

Exercise set IIIb), Question 3). Question from Chapter 5 of your text-book, 7th Edition, p. 281 – Problem 14 and Problem 15 (6th Edition, p. 279 – Problem 14 and Problem 15)

14. Weiss's paint store uses a (Q, R) inventory system to control its stock levels. For a particularly popular white latex paint, historical data show that the distribution of monthly demand is approximately normal, with mean 28 and standard deviation 8. Replenishment lead time for this paint is about 14 weeks. Each can of paint costs the store \$6. Although excess demands are back-ordered, the store owner estimates that unfilled demands cost about \$10 each in bookkeeping and loss-of-goodwill costs. Fixed costs of replenishment are \$15 per order, and holding costs are based on a 30 percent annual rate of interest.
    a. What are the optimal lot sizes and reorder points for this brand of paint?
    b. What is the optimal safety stock for this paint?
15. After taking a production seminar, Al Weiss, the owner of Weiss's paint store mentioned in Problem 14, decides that his stock-out cost of \$10 may not be very accurate and switches to a service level model. He decides to set his lot size by the EOQ formula and determines his reorder point so that there is *no stock-out* in 90 percent of the order cycles.
    a. Find the resulting (Q, R) values.
    b. Suppose that, unfortunately, he really wanted to satisfy 90 percent of his demands (that is, achieve a 90 percent fill rate). What fill rate did he actually achieve from the policy determined in part (*a*)?

Answers for Question 15:

Remember type 1 and type 2 service levels: In type 1 service level, we specify the probability of not stocking out in the lead time. In type 2 service level, we specify the proportion of demand that are met from stock.

<u>Part a)</u>

We determine the R value to satisfy the equation $F(R) = \alpha$, and we set $Q = EOQ$.

$$F(R) = 0.9$$

By using the table A-4 (or the table A-1), we find that $z = 1.28$

Therefore, $R = \sigma z + \mu = (14.96)(1.28) + 98 = 117.14$

Moreover, $Q = EOQ = 74.83$ by using question 14, part a, step 0.

Part b

We are asked to find the fill rate β when the policy in *part a* is used. We will use the formula

$$1 - \beta = \frac{n(R)}{Q}$$

where the value of $n(R)$ is determined by the policy in *part a* as follows:

$$n(R) = \sigma L(z) = 14.96 * L(1.28) = 14.96 * 0.0475 = 0.71$$

and we used the table A-4 in the third equation. Moreover $Q = 74.83$.

Therefore, $\beta = 0.9905$.