

# Homework 8

## Solutions

$$a) \mu_z = 5200/52 = 100$$

$$\sigma_z = 32.111 / \sqrt{52} = 10$$

b) Type I Service

$$\alpha = 0.95, F(R) = 0.95 \Rightarrow z = 1.64$$

$$R = \mu_z + z \cdot \sigma_z = 100 + 1.64 \times 10 = 116.4$$

$$Q^* = EOQ = \sqrt{\frac{2 \times 100 \times 5200}{200 \times 0.2}} = 161$$

c) Type II service

$$L(z) = (1 - \beta) \cdot Q / \sigma$$

$$\beta = 0.95, EOQ = 161$$

$$L(z) = 161 \times 0.05 / 10 = 0.805$$

$$z = -0.65$$

$$R_0 = 10 \times -0.65 + 100 = 94$$

$$n(R_0) = 8.05$$

$$1 - F(R_0) = 0.7422$$

$$Q_1 = \frac{8.05}{0.7422} + \sqrt{\frac{2 \times 100 \times 5200}{0.2 \times 200} + \left( \frac{8.05}{0.7422} \right)^2}$$

$$Q_1 = 173$$

$$L(z) = 0.05 \times \frac{173}{10} = 0.865 \Rightarrow z = -0.73$$

$$\Rightarrow R_1 = 10 \times -0.73 + 100 = 93$$

$$N(R_1) = 8.65, \quad 1 - F(R_1) = 0.7673$$

$$Q_2 = \frac{8.65}{0.7673} + \sqrt{\frac{2 \times 100 \times 5200}{0.2 \times 200} + \left(\frac{8.65}{0.7673}\right)^2}$$

$$Q_2 = 173$$

$$\Rightarrow R_2 = 93$$

$$\Rightarrow (Q, R) = (173, 93)$$

c) Type 1  $\Rightarrow$  proportion of cycles in which no stockouts occur.  
 Type 2  $\Rightarrow$  proportion of demand that are met from stock.

Type 1  $R >$  Type 2  $R$ , because it is harder to satisfy.

$$d) P = \frac{Q \cdot h}{[(1 - F(R)) \lambda]} \Rightarrow$$

Part a

$$P = \frac{161 \times 0.2 \times 200}{0.05 \times 5200} = 24.77$$

Part b

$$P = \frac{173 \times 0.2 \times 200}{0.7673 \times 5200} = 21.734$$