Problem 1:

(1): $Q = EOQ = \sqrt{\frac{2K\mu}{C_h}} = 122.47 \text{ units} = 123 \text{ unit}$

$R = D \times L = 50 \times 2 = 100 \text{ units}.$

(2): Weekly ordering cost $= KD/Q = \$12.248/\text{week}$

holding cost $= C_h \times \frac{Q}{2} = \$12.247/\text{week}$

(3): $Prob(D_L > R) \leq 1\%$

$Prob\left(Z > \frac{R-100}{7\sqrt{2}}\right) \leq 1\% \Longleftrightarrow P\left(Z \leq \frac{R-100}{7\sqrt{2}}\right) \geq 99\%.$

$\frac{R-100}{7\sqrt{2}} \geq 2.33 \quad R = 123.066$

$SS = R - \mu_2 = 23.066 = 24.$

(4): $Q.new = Q = 123.$

$R.new = 123.066 = 124.$

(5): avg. ordering cost $= K \cdot \frac{\mu}{Q} = 50 \times \frac{50}{123} = 12.195/\text{week} < 12.248/\text{week}$

avg. holding cost $= \frac{1}{2} C_h Q + C_h \times SS = 17.1/\text{week} > 12.247/\text{week}$

$12.195 - 12.248 + 17.1 - 12.247 \approx 4.805\$/\text{week}$

Problem 2:

(1): $K_1 = 100 + 30 = 130$, $L_1 = 2$ days $K_2 = 230$ $L_2 = 1$ day

$$Q_1 = \sqrt{\frac{2KM}{C_h}} = 671.32/\text{year} = 672/\text{year}$$

$$Q_2 = \sqrt{\frac{2 \cdot 230 \cdot 200 \cdot 52}{6}} = 892.94/\text{year} = 893/\text{year}.$$

(2)

#1: $D_L \sim N(57.14, 32.07)$ $R_1 = \mu_L + L_1 \cdot Z_\alpha = 131.06$ $SS = 74.72$

#2: $D_L \sim N(28.57, 22.67)$ $R_L = \mu_L + L_L Z_\alpha = 81.39$ $SS = 52.82$.

(3)

#1. avg. ordering cost $= k \cdot \frac{M}{Q} = 130 \cdot \frac{200 \times 52}{672} = 2011.9$

avg. holding $= 3 \times 672 + 75 \times 6 = 2466$

purchasing $= 30 \times 200 \times 52 = 312000$

#2: avg. ordering cost $= 2678.61$

avg. holding $= 2997$

purchasing $= 312000$

(4): total 1 = avg. ordering cost + holding cost + purchasing cost = 31647.9

total 2 = 2678.61 + 2997 + 312000 = 317675.61

what is the associated (Q, R) policy? -1

(5)

$$\text{Avg. Inv} = \frac{1}{2}Q + SS_1 = \frac{1}{2} \times 172 + 75 = 411$$

$$\text{Avg. flow time} = \frac{\text{Avg. Inv}}{\text{Avg. flow rate}}$$

$$= 14.385 \text{ days} \approx 15 \text{ days}$$