Engineering Optimization Homework

Tai Jiang

January 2024

1 Multiperiod Inventory Problem

- A company is scheduling its production for the next 3 months
- Demand for M1 through M3: 200,150,400
- Three types of costs
  - Regular-time labor: \$2000/product
  - Overtime labor: \$3000/product
  - Holding (end of each month): \$500/product
- Production capacities
  - at most 200 products with RT labor per month
  - unlimited with OT labor per month

P_t as the product for period t, t is the month.
P_{rt} as the regular-time labor product.
P_{ot} as the overtime labor product.
Demand limitation is Equation 1.:

$$\begin{aligned} P_{r1} + P_{o1} &\geq 200 \\ P_{r2} + P_{o2} &\geq 150 \\ P_{r3} + P_{o3} &\geq 400 \end{aligned} \tag{1}$$

Cost is Equation 2.

$$\begin{aligned} cost = {} & 2000P_{r1} + 3000P_{o1} \\ & + 2000P_{r2} + 3000P_{o2} + 500(P_{r1} + P_{o1} - 200) \\ & + 2000P_{r3} + 3000P_{o3} + 500(P_{r1} + P_{o1} + P_{r2} + P_{o2} - 200 - 150) \end{aligned} \tag{2}$$

The minimize total cost is Equation 3.

$$\begin{aligned} cost\downarrow &= 1675000 \\ P_{r1} &= 200, \quad P_{o1} = 0 \\ P_{r2} &= 200, \quad P_{o2} = 0 \\ P_{r3} &= 200, \quad P_{o3} = 150 \end{aligned} \tag{3}$$