Question 4

let x_{ij} denote the number of employees hired at the beginning of period i and released at the end of period j-1

Since we have the data of cost, we could calculate the sum of labor cost by multipling x_{ij} and C_{ij}. This is the objective function we want to minimize.

For the coustraints, in every period, the existing labor should be equal to the minimum labor.

$$\min \quad 20x_{12} + 35x_{13} + 50x_{14} + 55x_{15} + 15x_{23} + 30x_{24} + 40x_{25} + 25x_{34} + 35x_{35} + 10x_{45}$$

$$\text{s.t.} \quad x_{12} + x_{13} + x_{14} + x_{15} \geq 20 \qquad \in d_1$$

$$x_{13} + x_{14} + x_{15} + x_{23} + x_{24} + x_{25} \geq 15 \qquad \in d_2$$

$$x_{14} + x_{15} + x_{24} + x_{25} + x_{34} + x_{35} \geq 30 \qquad \in d_3$$

$$x_{15} + x_{25} + x_{35} + x_{45} \geq 25 \qquad \in d_4$$

$x_{12}, \ldots, x_{45} \geq 0$, and they are all integer.