1st month: $\sum_{i=1}^{n} x_i \geq n \frac{50}{100} = n/2$

2nd month: If we built a station in cluster j in a previous month: $x_j' = 1$

$$\sum_{i=1}^{n} x_i' \geq n \cdot \frac{80}{100} = \frac{4n}{5}$$

3rd month: If we built a station in cluster j in a previous month:

$x_j'' = 1$

$$\sum_{i=1}^{n} x_i'' = n$$

In months 2 and 3 the stations are accompanied with the optimum number of docks and bikes we placed in the previous months.

For the former plan:
minimum station capacity: 12
average station capacity: 23
maximum station capacity: 69

$m'_{ij} \sim N\left(\frac{y_i + y_j}{2 \cdot 23} m_{i,j}, 4\right)$ (rounded to the closest integer)

where, m'_{ij}: average number of times a bike started from cluster i and ended-up in cluster j

$2 \cdot 23 = 46$ is chosen assuming that capacity means number of bikes (amend if docks), can also be replaced with exact numbers if possible if we have time

$\frac{y_i + y_j}{2 \cdot 23}$: proportion to estimate the new routs according to the new installations

4: was choosen as $\sigma^2 = 2^2$, because from the old data, the average number of trips $i \to j$ is equal to 2, so it doesn't give a negative m'_{ij} (maybe a while statement is also required just in case)

m'_{ij} changes according to the distribution only when we have stations in both clusters i and j. The rest of the m'_{ij} are computed through the average terms in a new matrix M' just like before.

Similarly, we compute m''_{ij} for the 3rd month. The numbers 4 and 23 change as well according to the new results

- $social\_value' = \sum_i \sum_k p_k a_{ik} \sum_j (m'_{ij} + m'_{ji}) y'_i$
- $total\_cost' = c_1 \sum_i z'_i + c_2 \sum_i y'_i$
- $environmental\_value' = p_{car} c_{car} \sum_i \sum_j m'_{ij} h_{ij} x'_i$
- $x'_i \leq z_i + z'_i \leq M_i x'_i$ (1/month2)
- $x'_i \leq y_i + y'_i \leq z_i + z'_i$ (2/month2)
- $total\_cost' \leq \frac{4}{5} c_{max} - total\_cost$ (3/month2)
- $environmental\_value' \geq \frac{4}{5}$ (proportion) *
  *(total cost ... in a month) (4/month2)
- $y_i + y'_i \geq \sum_j (m'_{ij} - m'_{ji}) \ \forall i$ (5/month2)
- $\sum_{i=1}^{n} x'_i \geq \frac{4n}{5}$ (6/month2)

- $social\_value'' = \sum_i \sum_k p_k a_{ik} \sum_j (m''_{ij} + m''_{ji})(y''_i - y'_i - y_i)$
- $total\_cost'' = c_1 \sum_i z''_i + c_2 \sum_i y''_i$
- $environmental\_value'' = p_{car} c_{car} \sum_i \sum_j m''_{ij} h_{ij} x''_i$
- $x''_i \leq z_i + z'_i + z''_i \leq M_i x''_i$ (1/month3)
- $x''_i \leq y_i + y'_i + y''_i \leq z_i + z'_i + z''_i$ (2/month3)
- $total\_cost'' \leq c_{max} - total\_cost - total\_cost'$ (3/month3)
- $environmental\_value'' \geq$ (proportion) *
  *(total ... in a month) (4/month3)
- $y_i + y'_i + y''_i \geq \sum_j (m''_{ij} - m''_{ji}) \ \forall i$ (5/month3)
- $\sum_{i=1}^{n} x''_i = n$ (6/month3)