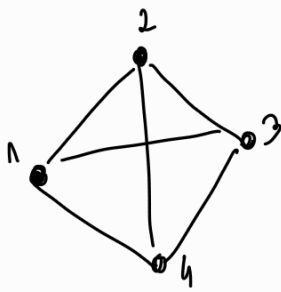


$\pi \geq 3$        $\pi = 3$

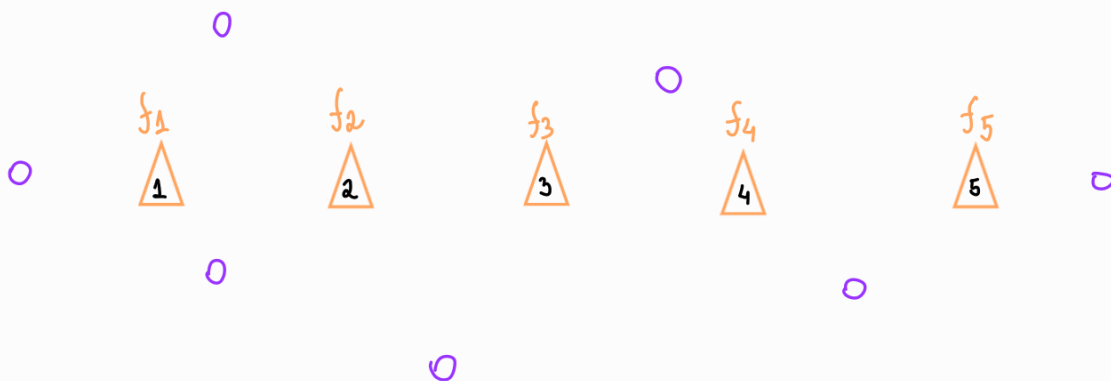


$$x_1 + x_2 + x_3 + x_4 \leq 1$$

0.33      0.25      0.9      1

## PROBLEMA DE AGRUPAMENTO (CLUSTER)

$K = 3$



$\triangle \rightarrow$  LOCALIDADES POSSÍVEIS

$\circ \rightarrow$  CLIENTE DISPONÍVEL

$\{0,1\} \in Y_i \rightarrow$  ABRIR OU NÃO UMA FACILIDADE

$F: i=1, \dots, m$

$C: j=1, \dots, n$

$\{0,1\} \in X_{ij} \rightarrow$  Atender o cliente  $j$  pela facilidade  $i$

Minimizar  $\sum_i \sum_j c_{ij} X_{ij} + \sum_i f_i Y_i$

CLIENTE 1

$$\sum_{i \in F} X_{ij} = 1 \quad j=1, \dots, n$$

$$X_{ij} \leq Y_i$$

$$\sum_{i \in F} Y_i = K$$

$$\sum_j \mu_j - \sum_j \mu_j \sum_i X_{ij}$$

$$\sum_i \sum_j c_{ij} X_{ij} + \sum_i f_i Y_i + \sum_j \mu_j \cdot (1 - \sum_i X_{ij})$$

$$\sum_i \sum_j X_{ij} (\underbrace{c_{ij} - \mu_j}_{\leq 0}) + \sum_i f_i Y_i$$

$X_{ij}=1 \quad Y_i=1$