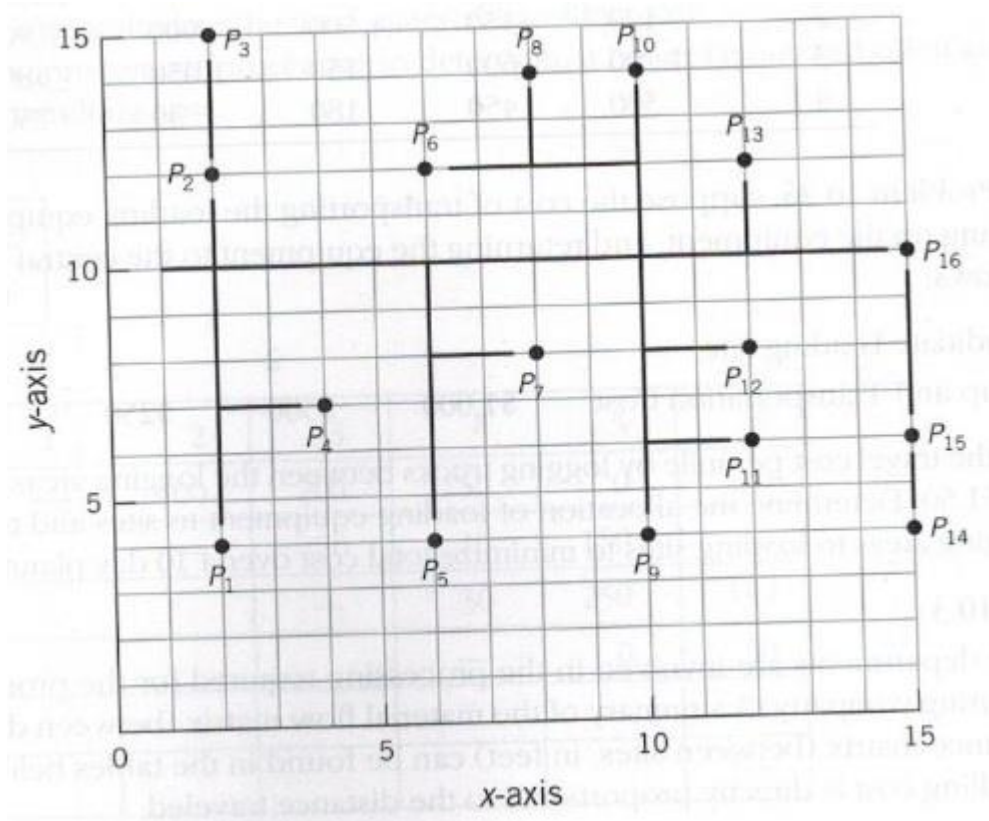


INDU 421: Facilities Design and Material Handling Systems

Assignment 9

- 1- Sixteen work stations are located as shown below on a tree network. The weights between existing facility I and the new facility to be located on the tree are, respectively, $w_1=5$, $w_2=3$, $w_3=3$, $w_4=1$, $w_5=4$, $w_6=2$, $w_7=3$, $w_8=6$, $w_9=2$, $w_{10}=3$, $w_{11}=4$, $w_{12}=1$, $w_{13}=1$, $w_{14}=2$, $w_{15}=3$, $w_{16}=2$.
- Determine the optimum location for the new facility using a minimsum criterion.
 - Determine the optimum location for the new facility using a minimax criterion.



- 2- In order to fulfil annual orders of five customers, a company can rent five manufacturing plants located in Toronto, Montreal, Los Angeles, New York and Chicago. The annual cost which is incurred if the product is provided by each facility is shown in the table below. Monthly rent for the facility located in Toronto is \$1,250, for the one in Montreal it is also \$1,250, for the one in Los Angeles \$2,000, for the one in New York \$1,250 and in Chicago it is \$3,000.
- a) If the company wants to rent three plants (no matter whether it is justified or not), decide which two plants should be selected and which customers should be served by each of the two plants in order to minimize the total cost with two plants. (1 point)

	TOR	MTL	LA	NY	CH
1	20,000	10,000	15,000	15,000	5,000
2	8,000	8,000	8,000	4,000	16,000
3	20,000	5,000	15,000	10,000	5,000
4	15,000	5,000	15,000	15,000	10,000
5	10,000	40,000	20,000	20,000	10,000

- 3- There are 3 customers, the coordinates of the facilities are: $P_1=(2,0)$, $P_2=(4,0)$, $P_3=(5,0)$. $W_1=1$, $w_2=4$, $w_3=1$. The cost of setting n new facilities is $3n$.
- How many facilities should be built?
 - Which customers should be served by which facilities?
 - Where these facilities should be located?
 - What is the minimum total cost?