

# INDU 421: Facilities Design and Material Handling Systems

## Assignment 8

- 1- Six housing subdivisions within a city area are targeted for emergency service by a centralized fire station. Where should the new fire station be located such that the maximum rectilinear travel distance is minimized? The centroid locations (in miles) are as follows:

Subdivision	x-Coordinate	y-Coordinate
A	20	15
B	25	25
C	13	32
D	25	14
E	4	21
F	18	8

- 2- A new elementary school is needed in a suburban area of Detroit. The location for the current residential areas and expected number of students from each residential area are shown in the table below.
- Determine the optimal location for the new elementary school such that the total distance the students have to travel is minimized.
  - Determine the total distance for the optimal location.
  - After extensive research, the school board has narrowed down its choices to three possible sites. Which one out of the three possible locations whose coordinates are shown below would you choose?

Residences	x-Coordinates	y-Coordinate	Number of students
A	20	25	600
B	36	18	400
C	62	37	500
D	50	56	300
E	25	0	200

Fall 2013

Possible sites for the new elementary school.

Possible Sites	x-Coordinate	y-Coordinate
1	50	50
2	30	45
3	65	28

- 3- Let four existing facilities be located at  $P_1 = (0, 10)$ ,  $P_2 = (5, 10)$ ,  $P_3 = (5, 15)$ ,  $P_4 = (10, 5)$  with  $w_1 = 15$ ,  $w_2 = 20$ ,  $w_3 = 5$ ,  $w_4 = 30$ . Determine the optimum location for a single new facility when cost is proportional to rectilinear distance. Construct an iso-cost contour line passing through the point having coordinates  $(15,10)$ .