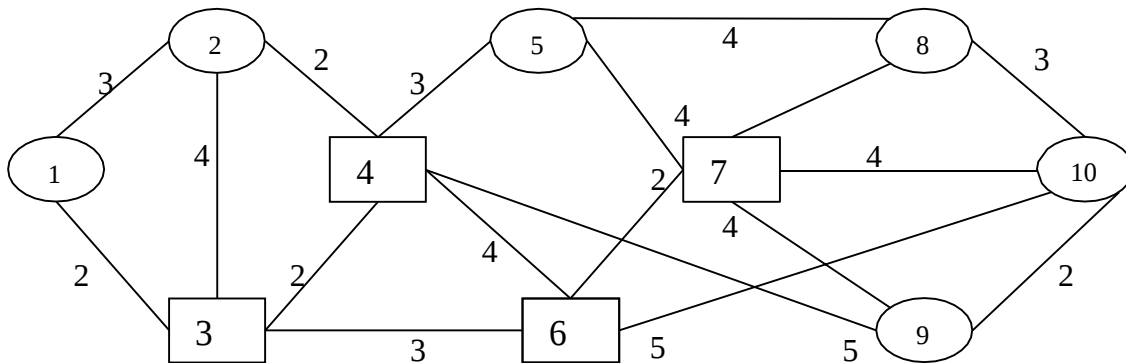


IE 479: HW3

Question 1: Consider the following transportation network where the numbers on arcs represent the traversal time of the arc.



- a) Say nodes $N = \{1, 2, 5, 8, 9, 10\}$ are customers and nodes $M = \{3, 4, 6, 7\}$ are alternative sites. Construct the coverage matrix $A = [a_{ij}]$ for $T = 5$

$$a_{ij} = \begin{cases} 1 & \text{if } d_{ij} \leq T \\ 0 & \text{otherwise} \end{cases}$$

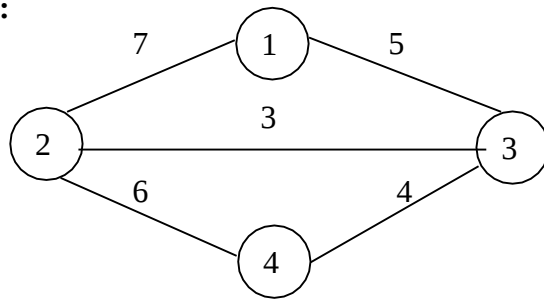
- b) Consider

$$\begin{aligned} & \text{Min } \sum_i f_i y_i + \sum_j P_j Z_j \\ & \text{subject to} \\ & \sum_i a_{ij} y_i + Z_j \geq 1 \quad \forall j \in N \\ & y_i, Z_j \in \{0,1\} \quad \forall j \in N, \forall i \in M \end{aligned}$$

Say $P_j = 3 \quad \forall j$ and $f = (5, 9, 6, 8)$

Find a solution using the dual greedy approach discussed in class.

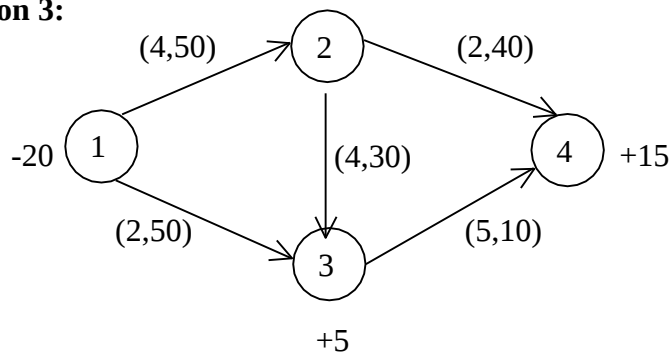
Question 2:



Find the optimum center location

- a) Locate on nodes only
- b) Locate anywhere along the arcs

Question 3:



Find the optimum shipment structure using network simplex algorithm. $(c_{ij}, u_{ij}) = (\text{cost}, \text{capacity})$