Coding Quiz 1

March 21, 2023

Instructions:

- Drop only your .R file here: https://www.dropbox.com/request/AiDC7YaCebyMdwWvXJje.

  NO other files should be submitted through this link.
- Accepted format of the file: 11111111.R (where '11111111' is your roll number).

  Use your full name and IITK email address while submitting your R code.

  If you submit multiple files, I will execute your .R file only.

  Moreover, **grading will be based solely on this file**.
- Output should be printed strictly in the order of the questions given below.
- Total marks: 20
- Time: 30 minutes (6:30pm to 7pm).

  Needless to say, R codes dropped **after 7pm will not be graded**.
- Only text written below in Red should be printed when the R code is executed.

Read the set of instructions given above again before moving to the next page.

1. A transportation model is for moving material from one place to another at the lowest possible costs. It has sets of source points as well as destination points.

   Consider the following source points (with supply stated in brackets):
   α (1000 units), β (1500 units) and γ (1200 units).
   Also, consider the following destination points (with demand shown in brackets):
   A (700 units), B (900 units), C (1200 units) and D (900 units).

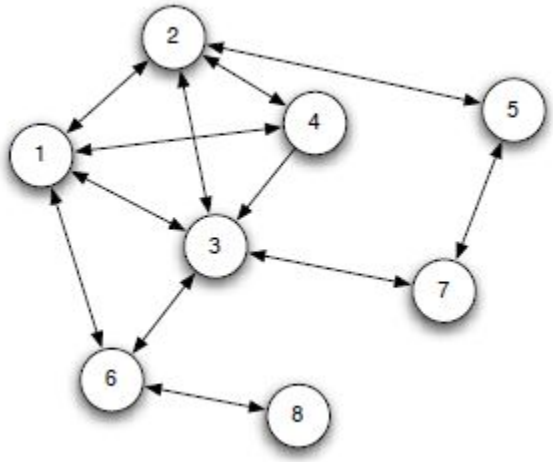
   The matrix of transportation costs is given below.

	A	B	C	D
α	65	57	22	42
β	36	30	30	60
γ	65	70	55	42

   The goal is to get as much shipped as possible at the lowest possible cost. Solve this transportation problem.

   Print the optimal transportation plan as a table.

2. Consider the following directed graph:



   List all the pairs of nodes that have two shared neighbors in common. Also, list all the pairs of nodes that share three neighbors.

   Print in the form "$i - j$" for nodes i and j.

   Compute the Laplacian matrix, and check if there are any isolated vertices.

   Print either "TRUE", or "FALSE".

Output marks: $4 + (2 + 4) = 10$

R code marks: $5 + 5 = 10$