

## Lab. 11 - Graph Problems (2)

Read the graphs given in the attached files (already given in the previous lab class) into their adjacency matrix, namely

- graph\_10\_60.txt,
- graph\_10\_90.txt,
- graph\_20\_60.txt,
- graph\_20\_90.txt
- graph\_50\_60.txt,
- graph\_50\_90.txt,
- graph\_100\_60.txt,
- graph\_100\_90.txt

and solve the following problems for each graph:

### 11.1 Spanning trees

1. Use the Prim's algorithm studied in the lecture to obtain the minimum spanning tree (MST) of the graph, in the form of an adjacency matrix.
2. Assume that the graph corresponds to a distribution network, for which some redundancy is intended. For this purpose, specify a program that obtains, in the form of an adjacency matrix, the two minimal spanning trees that share no arc between them.

**Hint:** Obtain a MST, remove the arcs, and obtain a second MST

### 11.2 Maximum Distances

Use the Floyd-Warshall's algorithm to

- a) Identify the most central node of the graph;
- b) Identify the pair of nodes of the graph more far apart; and
- c) Obtain the path between these nodes.