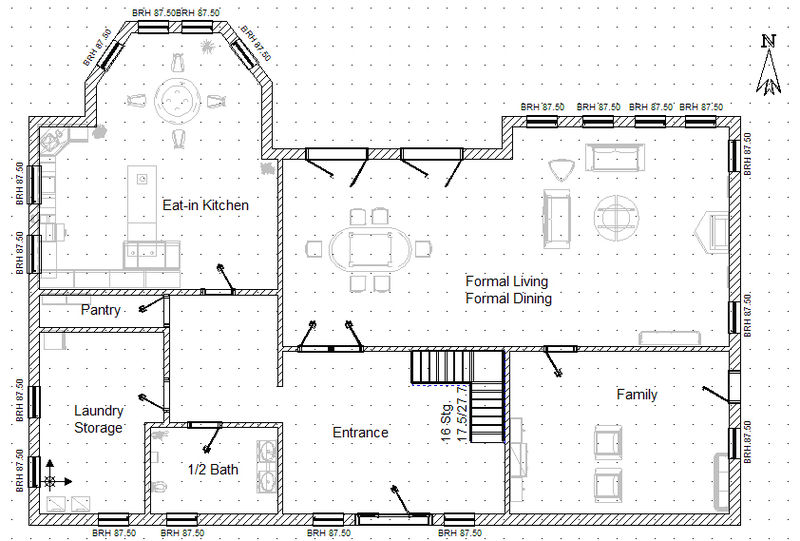
 NESA exemplar question solutions

N2.1 Networks

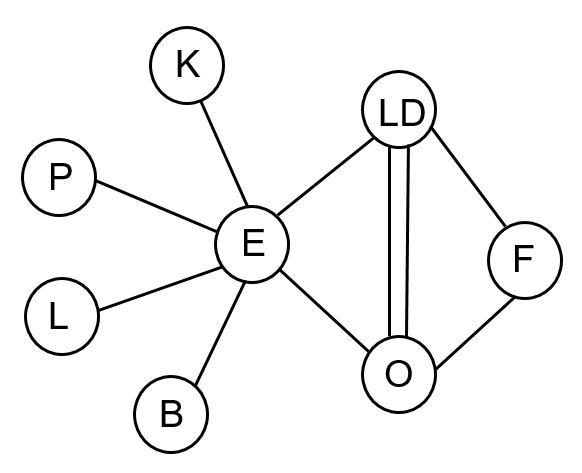
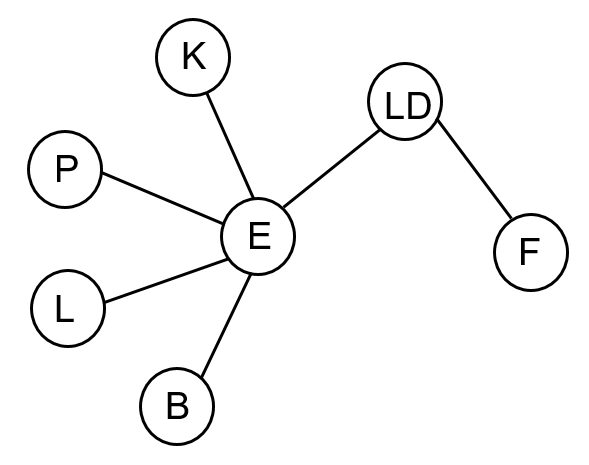
Solutions for questions from the NESA topic guidance related to networks.

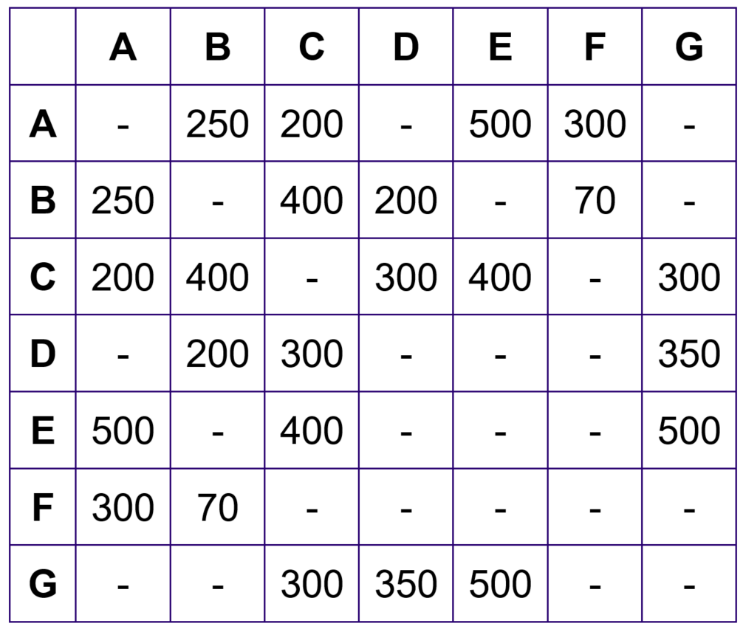
1. Model the following house plan as a network, showing doors (doorways) as edges and the rooms as vertices.

[](https://upload.wikimedia.org/wikipedia/commons/9/9a/Sample_Floorplan.jpg)

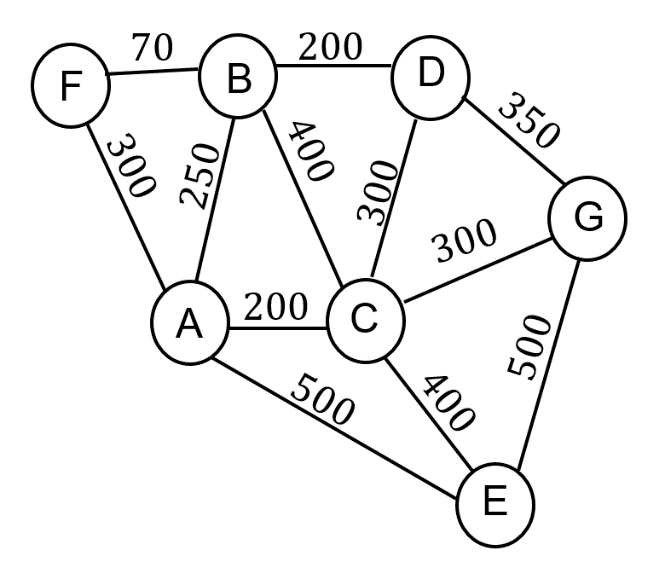
Solution:

Note: In the first solution an additional ‘room’ has been included to represent the outside. This allows all doors to be represented as edges.

1. Draw a network diagram to illustrate the following table:  
   

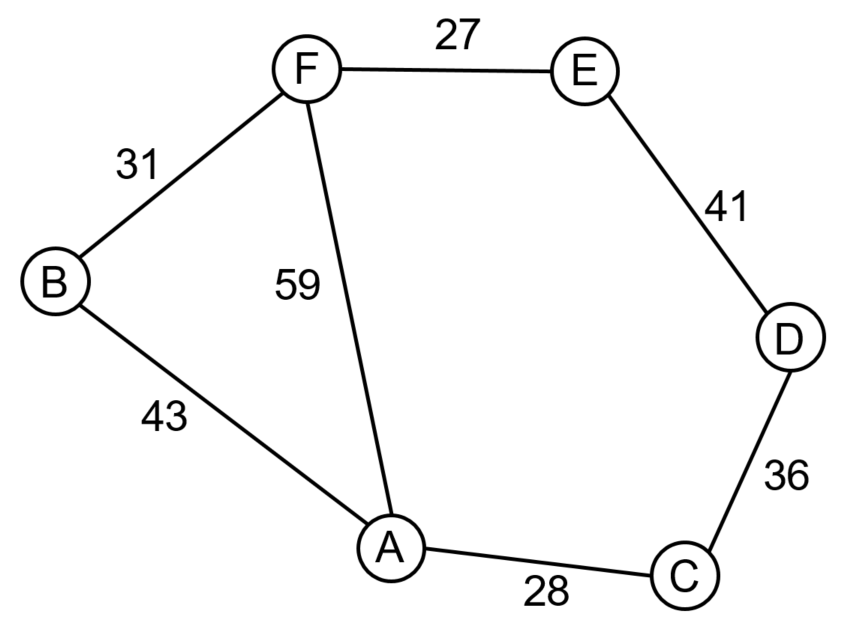
Solution:



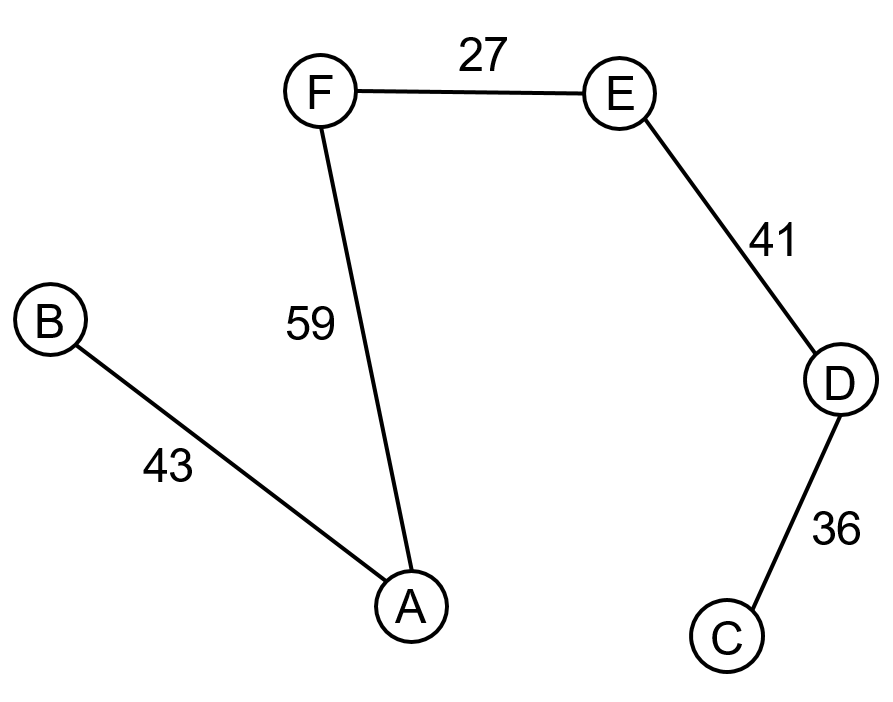
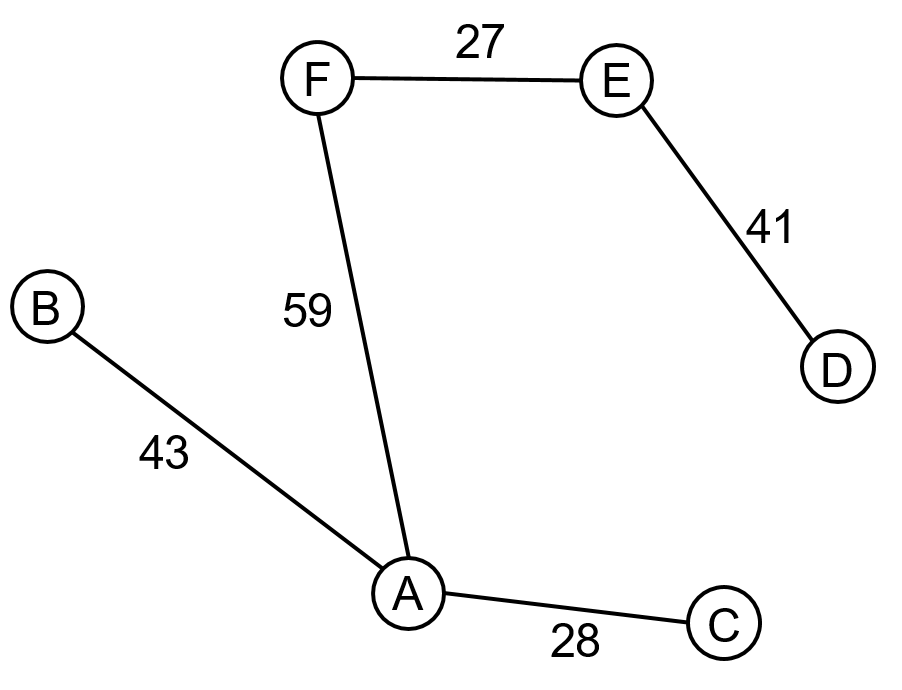
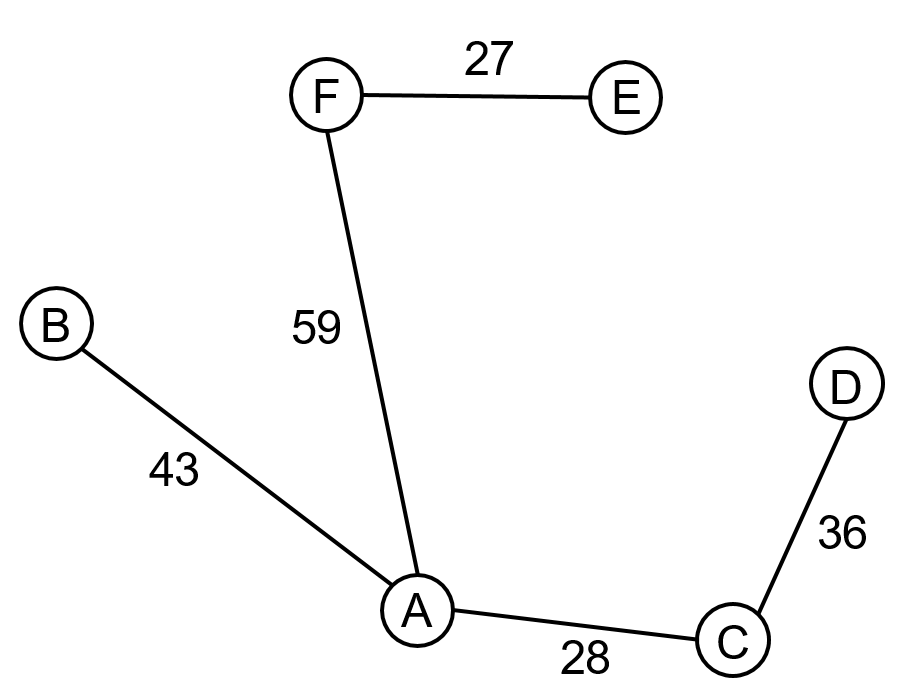
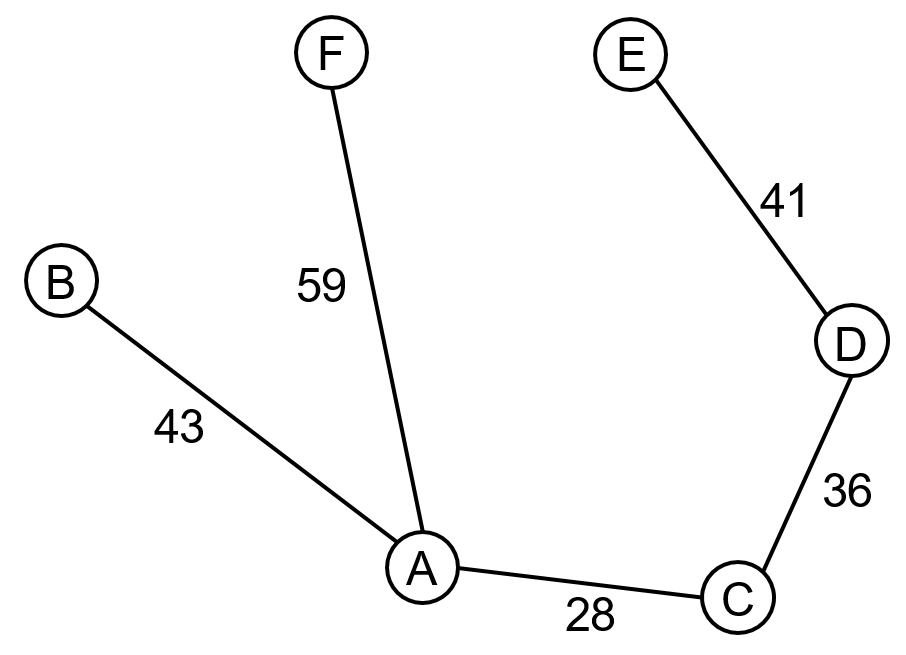
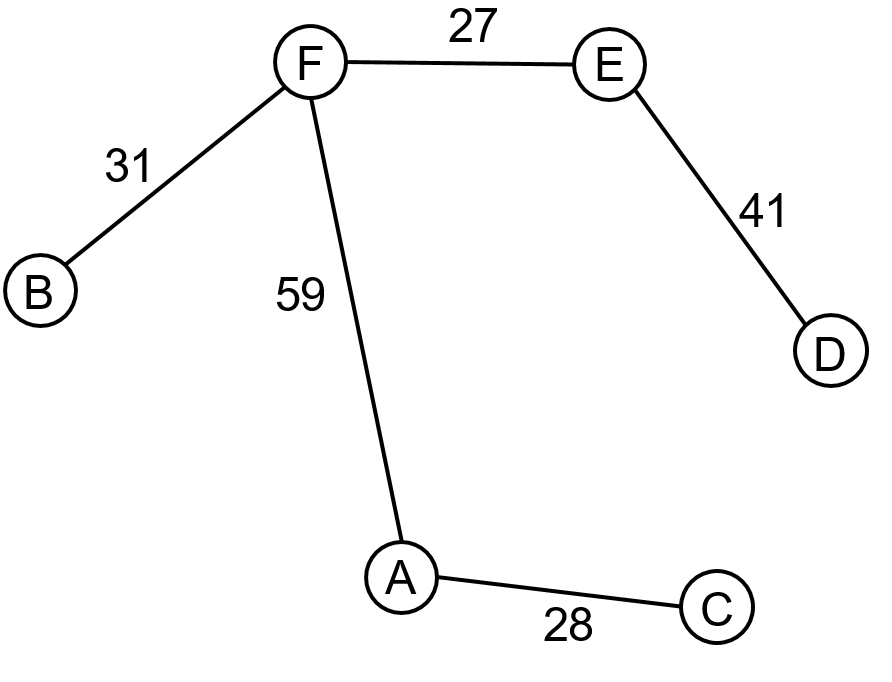
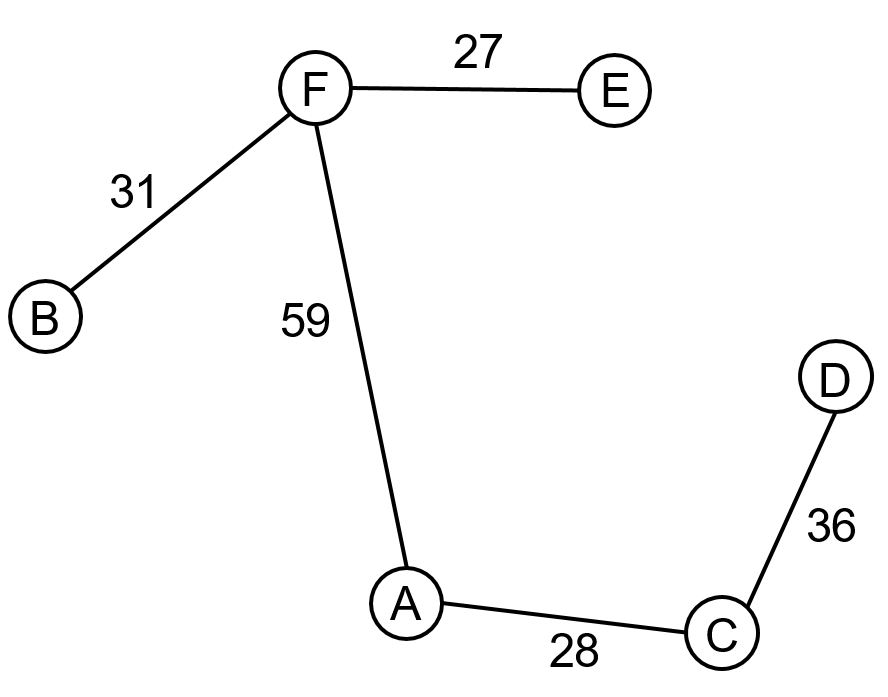
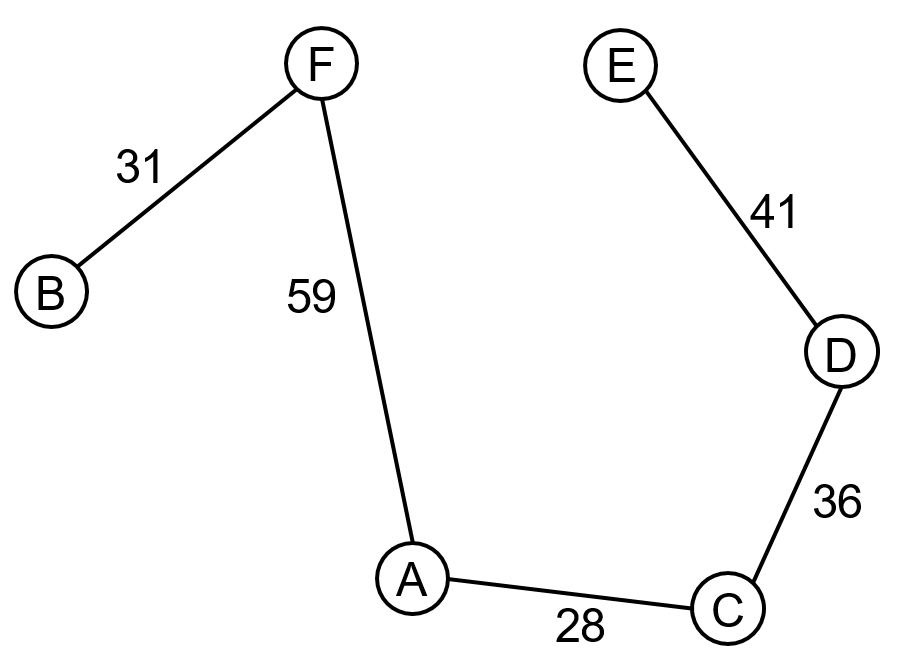
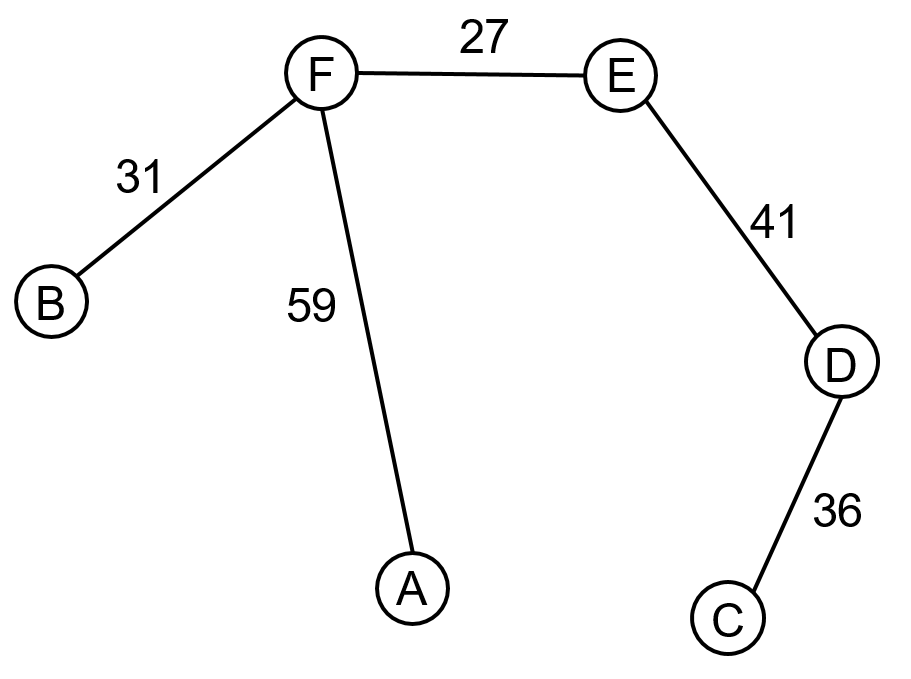
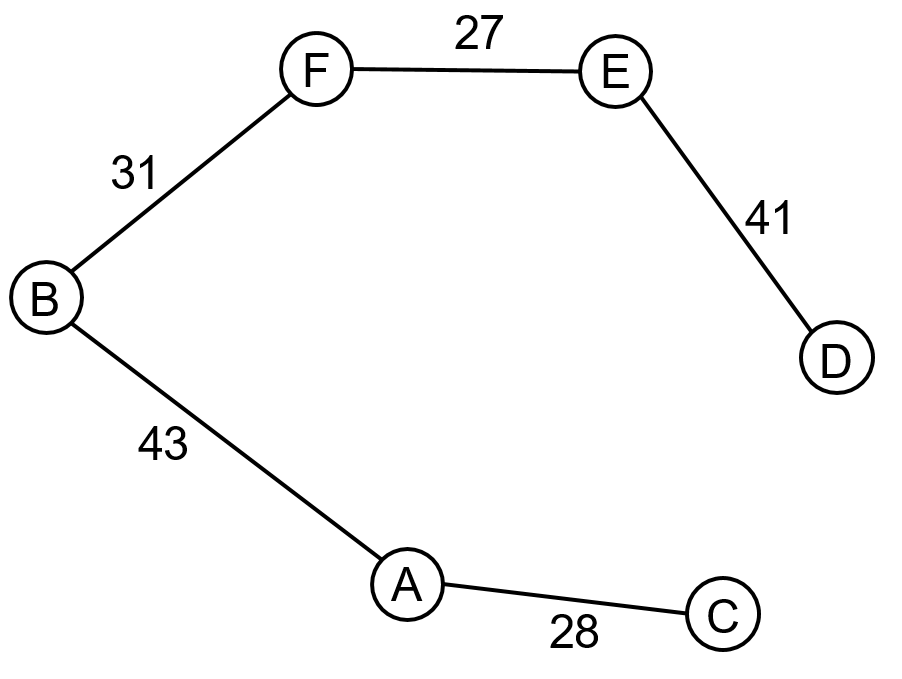
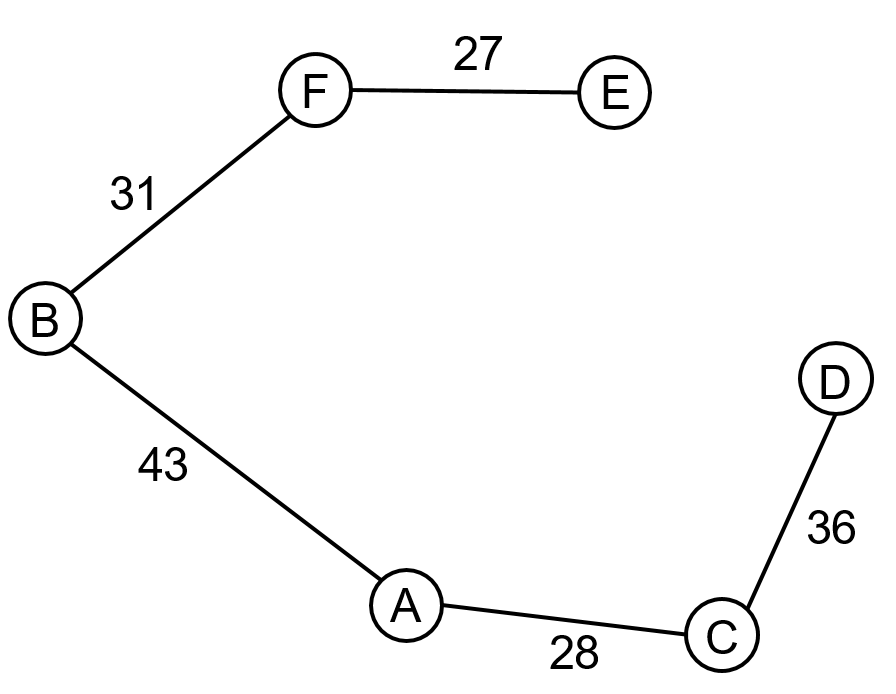
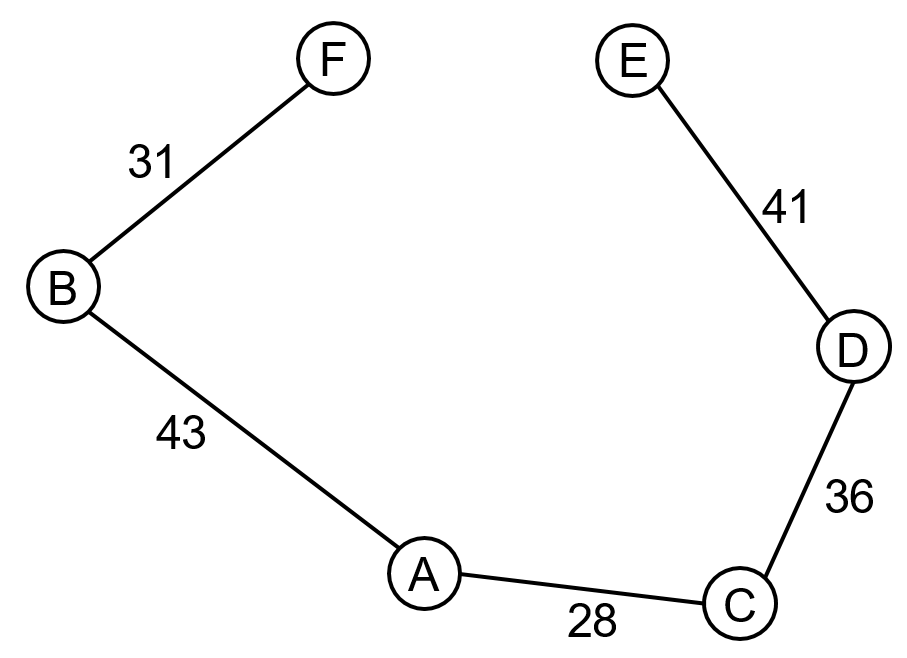
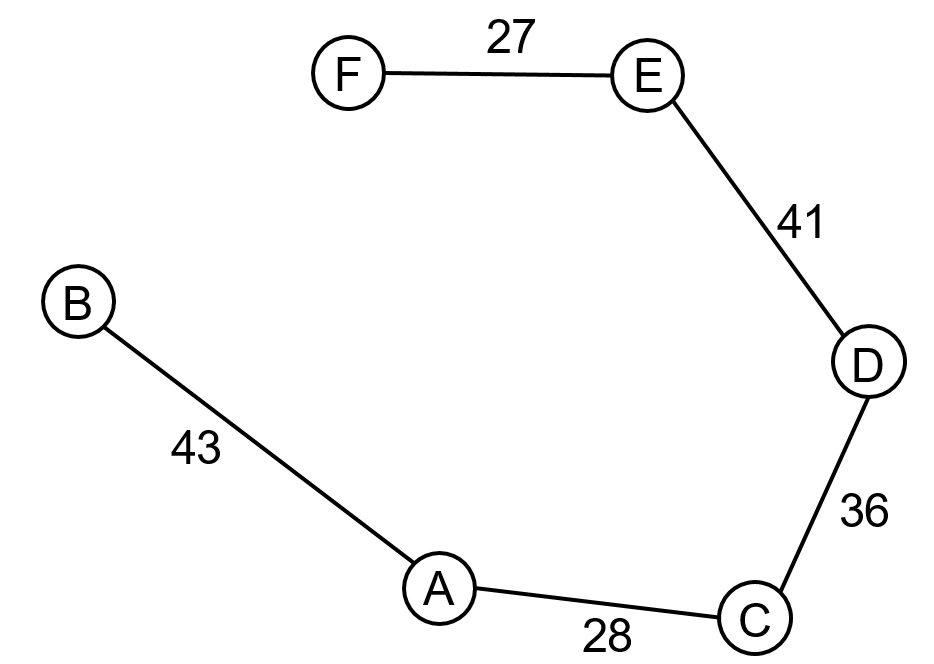
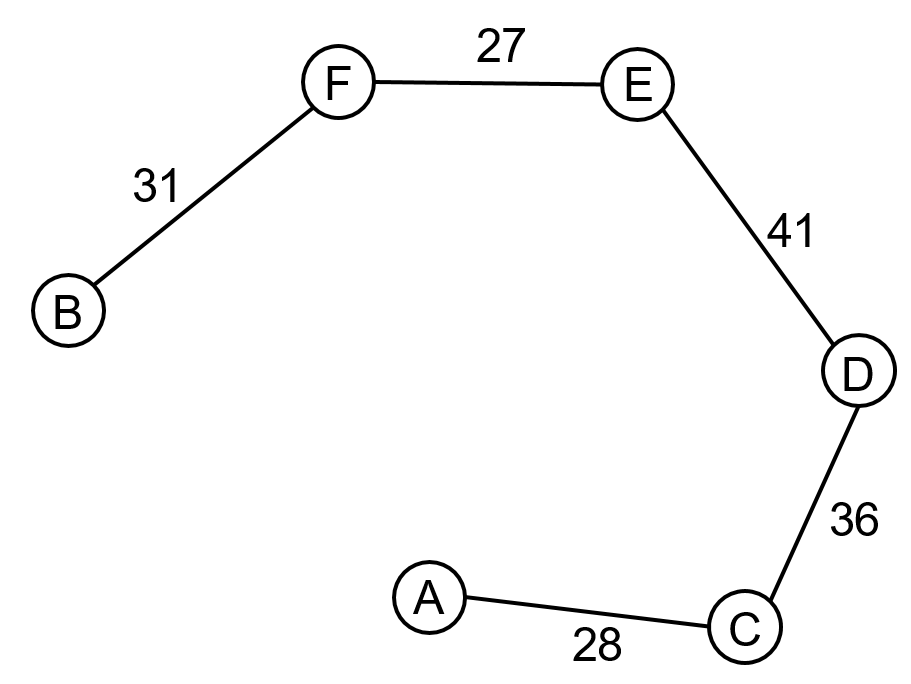
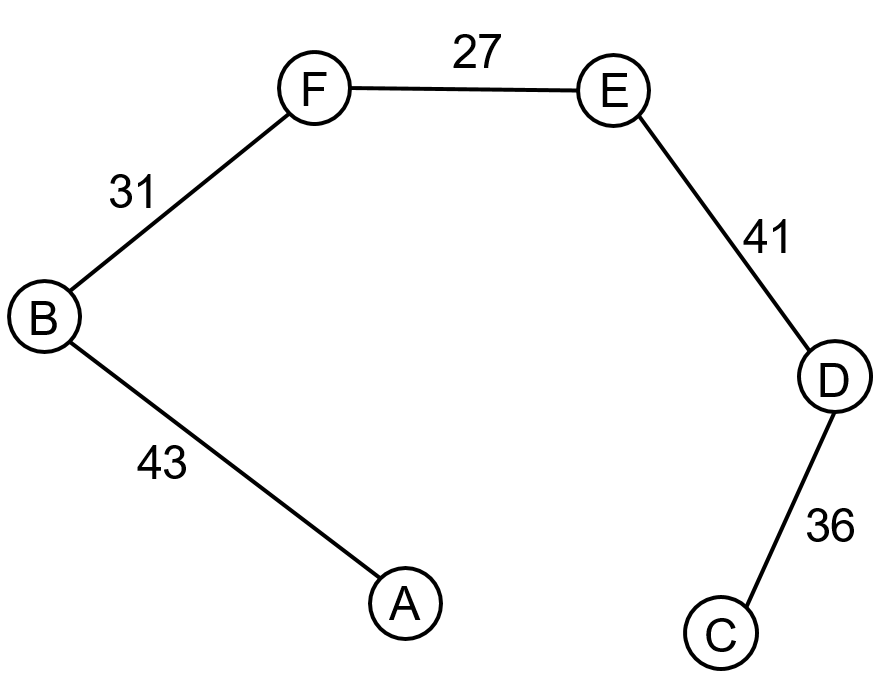
N2.2 Shortest paths

Solutions for questions from the NESA topic guidance related to shortest paths.

1. For the following network:

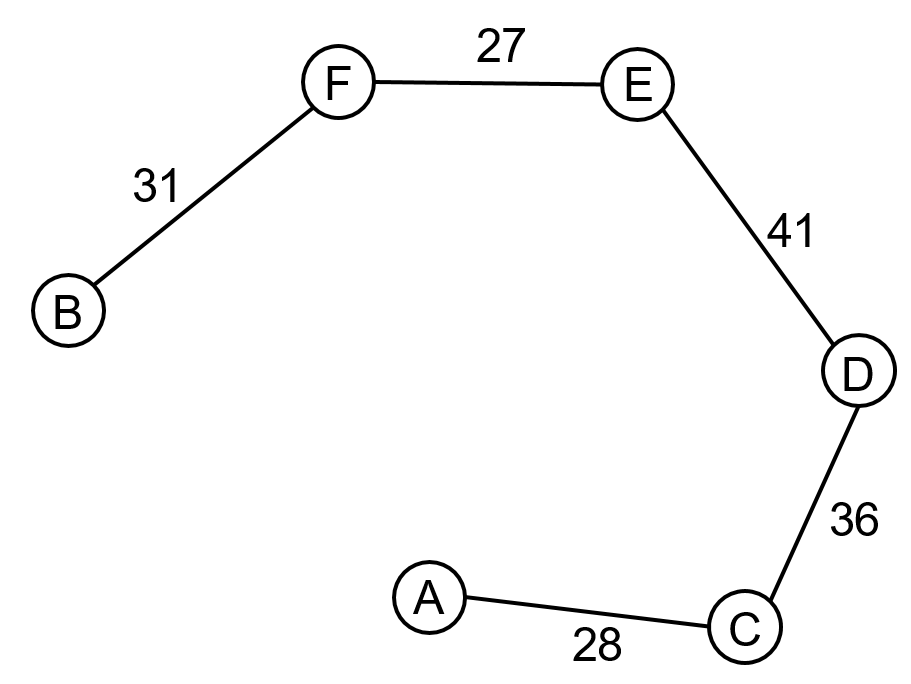


1. Find all possible spanning trees



1. Which of the spanning trees has the minimum weight?

Solution:



units

1. Use Prim’s algorithm, starting with vertex , to find the minimum spanning tree.

Solution*:*

units

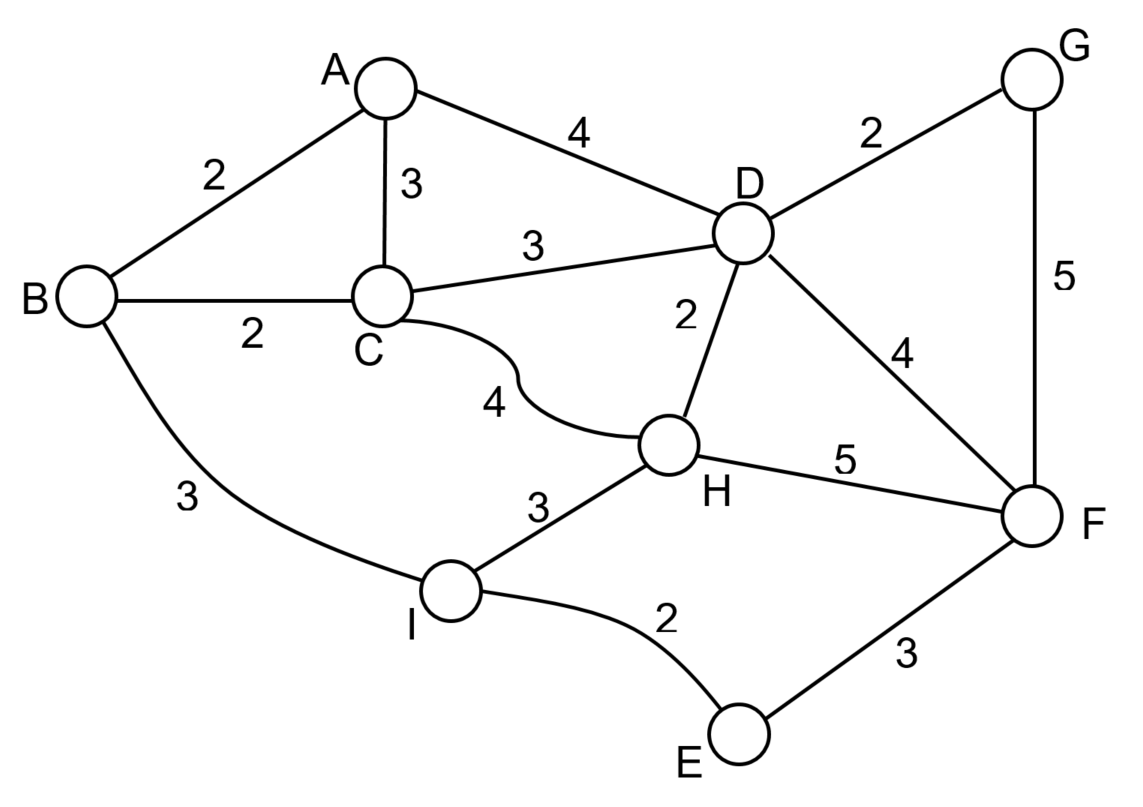
1. Show that Kruskal’s algorithm produces the same minimum spanning tree as Prim’s algorithm

Solution:

Stop here as all vertices have been connected

units

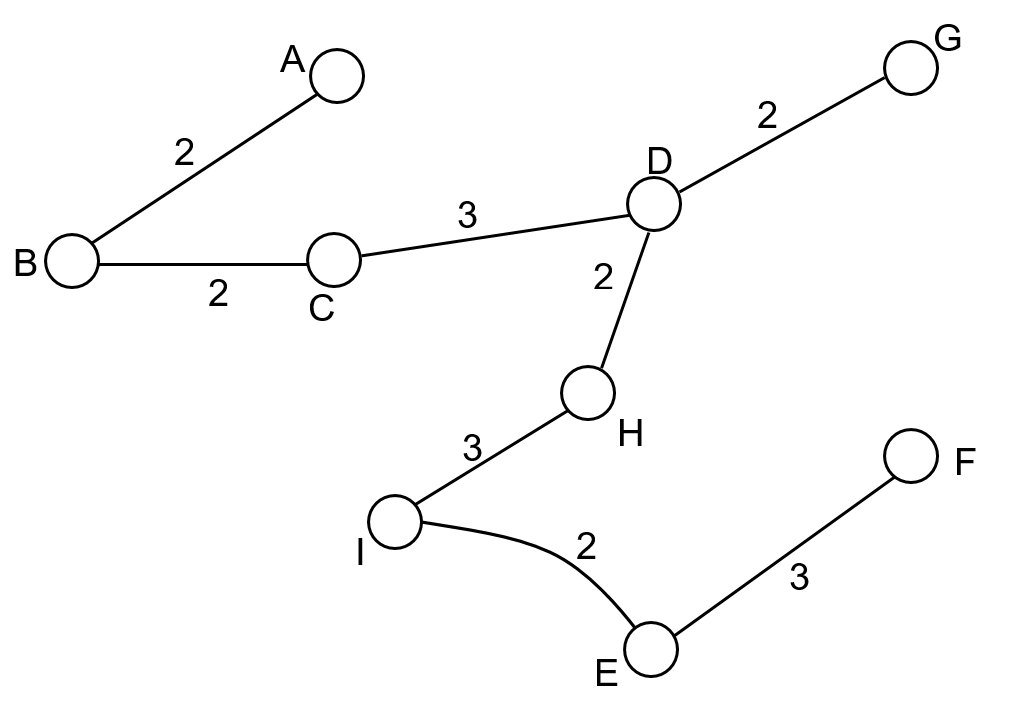
1. Consider the following network:



1. Find the minimum spanning tree.

Solution:

Note: that this is not the only solution.



units

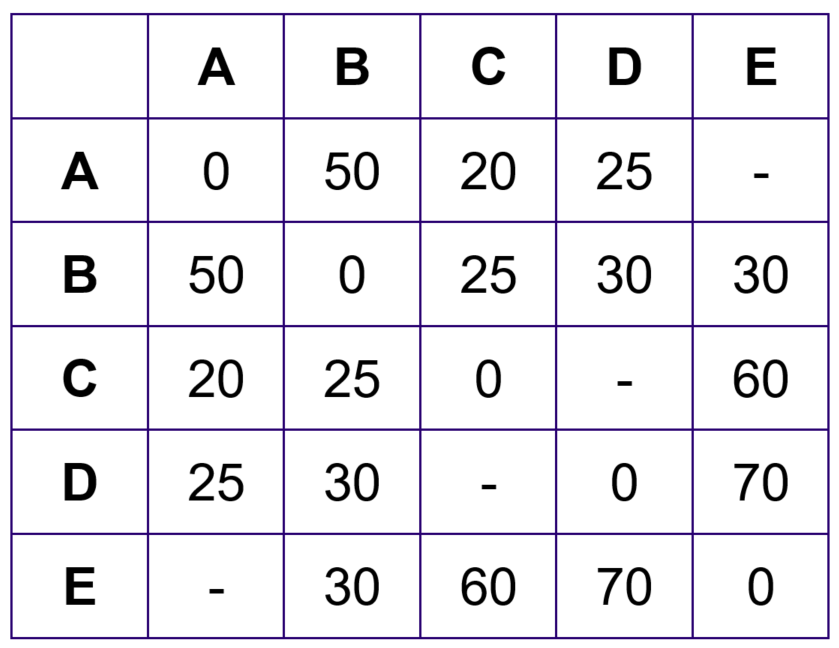
1. Find the length of the shortest path from to in the network.

Solution:

units

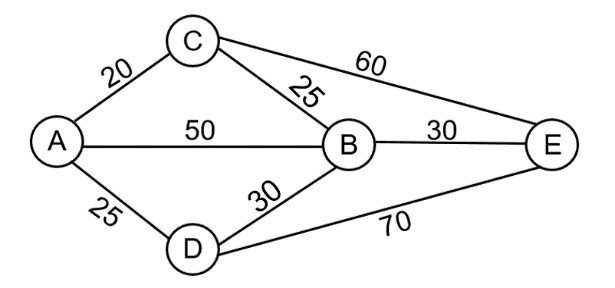
1. The following table shows the travelling times in minutes between towns which are connected directly to each other.

Note: The dash in a box indicates that towns are not connected directly to each other:



1. Draw a network diagram showing the information on this table.

Solution:

**

1. Find the shortest travelling time between and

Solution:

units