

PROBLEM SET 5

7.11) a. The smallest number of point-to-point communication links is $N-1$

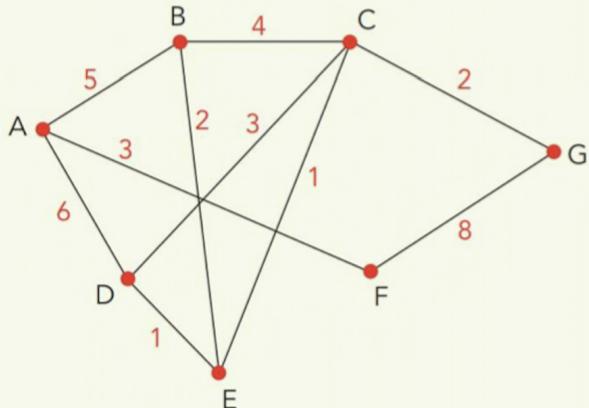
b. To avoid any problems with a disconnected network, all nodes should be connected with each other.

7.12) The advantage of having more nodes than the minimum amount is avoiding failures. If there is a communication error between two nodes, another path can be easily found.

7.20) Splitting messages into packets prevents the messages from getting changed or edited in transmissions. If there is an error in one packet, the majority of the remaining packets still contain the original message. In addition, using packets can increase the efficiency of communication. Each packet can travel through a different route, decreasing the traffic in a specific route.

7.17) No, because the heuristic only looks at the lowest weight link when sending a message. In a case where the destination node has the highest weight, the message will never reach that node.

7.16)



a. A - B - C - G

A - F - G

A - D - C - G

A - B - E - C - G

A - D - E - B - C - G

A - B - E - D - C - G

A - D - E - C - G

7 total paths

b.

A	0	X	X	X	X	X	X	X	X
B	∞	5	5	X	X	X	X	X	X
C	∞	∞	∞	9	9	8	X	X	X
D	∞	6	6	6	X	X	X	X	X
E	∞	∞	∞	7	7	X	X	X	X
F	∞	3	X	X	X	X	X	X	X
G	∞	∞	11	11	11	11	10		
	C								

$$S = \{A, F, B, D, E, C, G\}$$

Shortest Path:

A - D - E - C - G

Delay: 10

A	0	X	X	X	X	X	X	X
B	∞	5	5	X	X	X	X	X
C	∞	∞	∞	9	9	X	X	X
D	∞	6	6	6	X	X	X	X
E	∞	3	X	X	X	X	X	X
F	∞	∞	11	11	11	11		
G	∞	∞						
	C							

$$S = \{A, F, B, D, C, G\}$$

New shortest path:

A - D - C - G

7. 21) The history of the internet is a broad statement, but can be captured by a few integral moments and ideas in history. In 1962, J.C.R Licklider wrote a series of memos about a "Galactic Network" concept that largely resembled the idea of the internet today. The idea that, with a set of connected computers, people could access the same data & programs at any given time.

The first key step to creating a network that could be used from one side of a country to another was done by Larry Roberts and Thomas Merrill when they connected two computers using a low speed dial-up line across the country. This connection resulted in 2 things: the realization that computers could work well together on the same network, and the obvious need for the packet switching that was suggested by Kleinrock.

After many talks and improvements regarding ARPANET, and due to Kleinrock's early involvement in its construction, his lab at UCLA was selected to be the first node on the ARPANET. Next, a node at Stanford Research Institute (SRI) was added, and the first host-to-host message was sent from Kleinrock's lab at UCLA to SRI. Following this, nodes were added at a higher rate to the same ARPANET network.