Angela Tseng

Homework 1: Basic Measures

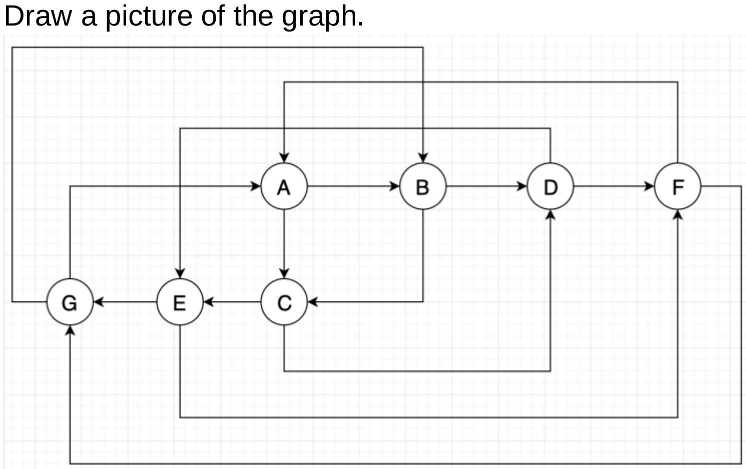
1) Complete the adjacency matrix for the early Internet drawing that was started in class.

	RAND	UCSB	SU	UCB	SRI	UCLA	SDC	UTAH	WU	ILL	MICH	CMU	ARPA	BTL	HARV	LL	BBN	MAC	DART
RAND	0	0.3	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0
UCSB	0.3	0	0.7	0	0	0.3	0	0	0	0	0	0	0	0	0	0	0	0	0
SU	0	0.7	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	8	0
UCB	0	0	1	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0
SRI	0	0	0	1	0	1	0	0	0	0	0	0	0	0	8	0	0	0	0
UCLA	0	0.3	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0
SDC	1	0	0	0	0	1	0	0	5	0	0	0	0	0	0	0	0	0	0
UTAH	2	0	0	1	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0
WU	0	0	0	0	0	0	5	0	0	0.4	0	1.8	0	0	0	0	0	0	0
ILL	0	0	0	0	0	0	0	4	0.4	0	1	0	0	0	0	0	0	0	0
MICH	0	0	0	0	0	0	0	0	0	1	0	0	0	1.5	0	0	0	0	1.8
CMU	0	0	0	0	0	0	0	0	1.8	0	0	0	0.5	0	0	0	1.4	0	0
ARPA	0	0	0	0	0	0	0	0	0	0	0	0.5	0	0.6	0	0	0	0	0
BTL	0	0	0	0	0	0	0	0	0	0	1.5	0	0.6	0	0	0.6	0	0	0
HARV	0	0	0	0	8	0	0	0	0	0	0	0	0	0	0	NULL	0	0	0.3
LL	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6	NULL	0	1	0	0
BBN	0	0	0	0	0	0	0	0	0	0	0	1.4	0	0	0	1	0	NULL	0
MAC	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	NULL	0	0.3
DART	0	0	0	0	0	0	0	0	0	0	1.8	0	0	0	0.3	0	0	0.3	0

2) Consider the following adjacency matrix:

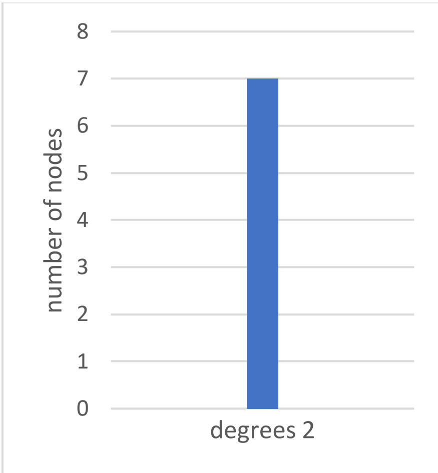
	A	B	C	D	E	F	G
A	0	1	1	0	0	0	0
B	0	0	1	1	0	0	0
C	0	0	0	1	1	0	0
D	0	0	0	0	1	1	0
E	0	0	0	0	0	1	1
F	1	0	0	0	0	0	1
G	1	1	0	0	0	0	0

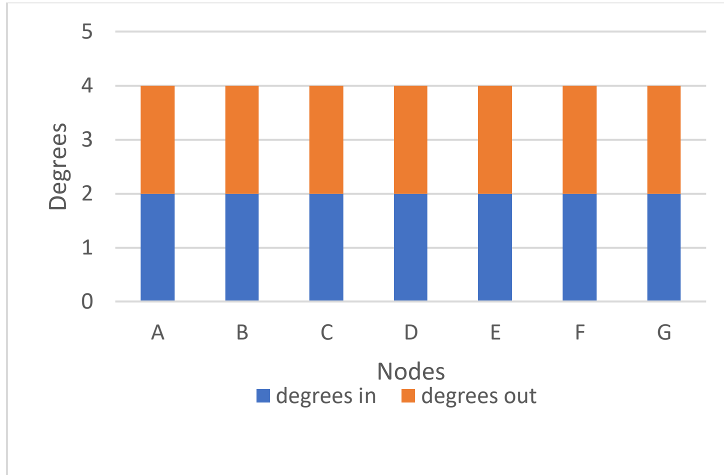
a) Draw a picture of the graph.



b) Compute the in and out degree for each node
in-degree -> 2, out-degree -> 2

c) Create a bar chart where the nodes are along the horizontal axis and the in and out degrees are vertically above it (feel free to use Excel for this). This graph is called a *degree distribution*.





d) In real-world terms, what do you think it could mean if the degree distribution is skewed (that is some nodes have a higher degree than others)?

If the degree distribution is skewed, one node, whatever it may represent, has more connections to other nodes, and therefore could be more advantaged or disadvantaged. In addition, they could be center in the neighborhood, which would contribute to an increased degree due to the multitude of connections.

3) For each of the following networks, answer the following:

a) What is the degree of nodes A? Node B?

4. A: 4
B: 4
5. A: 12
B: 1
6: A: 3
B: 2

b) What is the degree distribution of each network?

4: symmetric and even, all nodes share the same amount
5: node A has a significant amount of connections while the others have only one, very skewed
6: fairly even, the degrees are either 2 or 3 in this network

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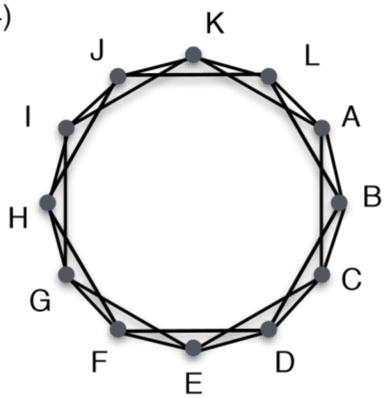
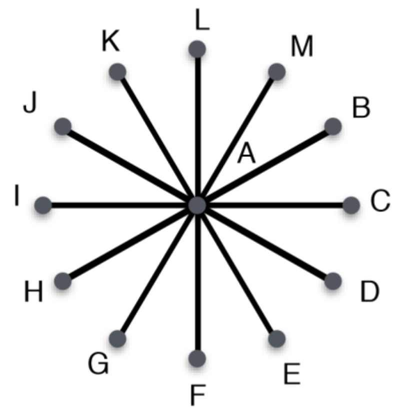
4)



5)



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