	Course: Communications & Networks (BCM-0506)	
	Professor: Carlos Alberto Kamienski	Data: 18/07/2016
	Student:	RA:

Exam #1 – 2016.2 – Group A

1) Consider the following adjacency matrix:

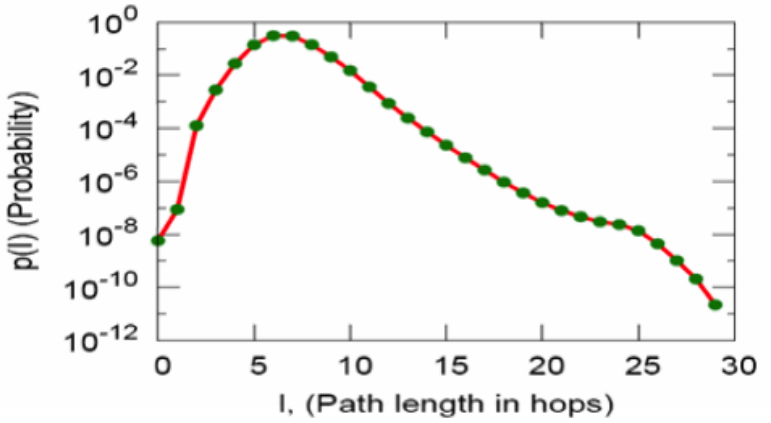
$$A = \begin{bmatrix} 0 & 1 & 1 & 1 & 0 & 0 \\ 1 & 0 & 1 & 0 & 0 & 0 \\ 1 & 1 & 0 & 0 & 0 & 1 \\ 1 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 1 & 1 & 1 & 0 \end{bmatrix}$$

   a) Draw the graph representing by this adjacency matrix

   b) Compute the diameter of this graph

   c) Assuming vertices are called A, B, C, D, E and F (top to bottom or left to right), compute the path from A to E using the Depth-First Search (DFS) algorithm

2) The chart below shows average path lengths (X axis) versus their probability of occurrence (Y axis)



   a) What category of complex network this chart is representing? Please explain your answer.

   b) What are the implications of it, i.e., what does it mean for a network to be in that category?

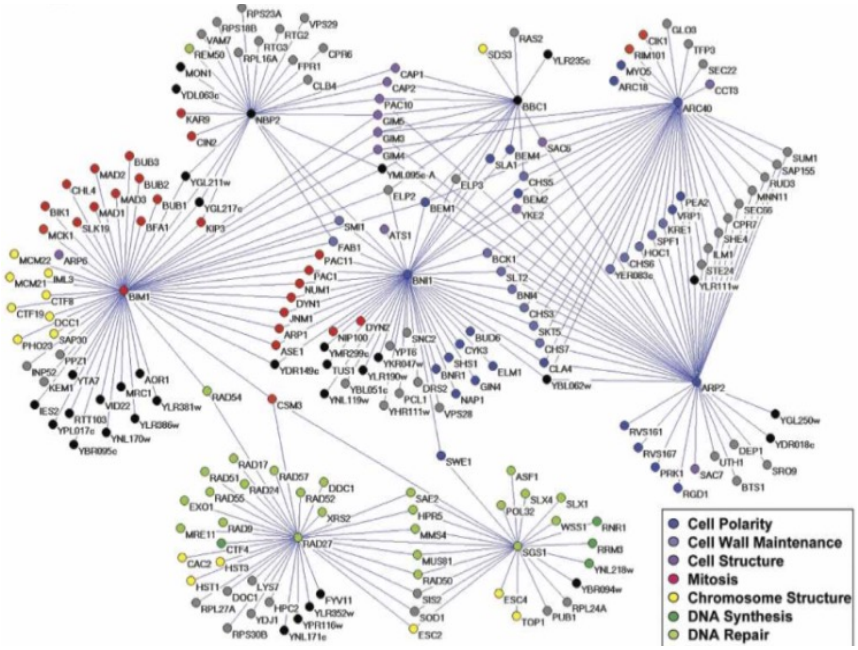
3) Consider (visually) the following gene interaction network and answer:

a) Does it have characteristics of (i.e. resemble) a random network? Why?

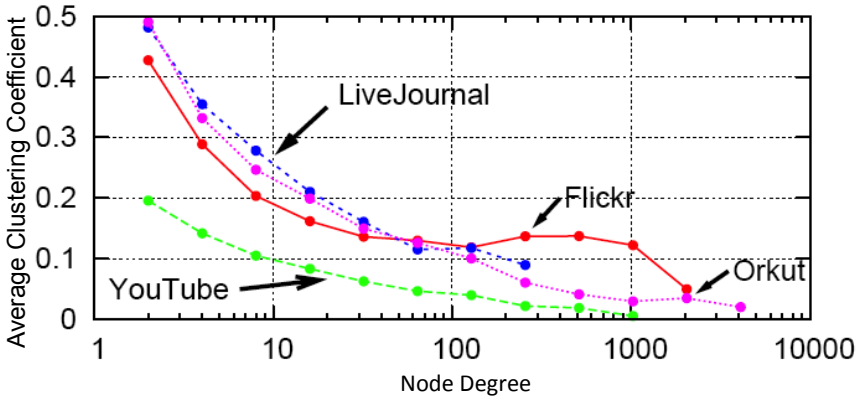
b) Does it have characteristics of (i.e. resemble) a small world network? Why?

c) Does it have characteristics of (i.e. resemble) a scale free network? Why?

d) Can you see any evidence that this network follows a power law? Why?



4) The chart below depicts node degree of four networks (YouTube, Orkut, LiveJournal and Flickr) versus clustering coefficient computed only between a node and its neighbors (i.e. the Watts & Strogatz alternative clustering coefficient).



a) What does this chart mean? Consider the decreasing trend of the curves.

b) The curve representing YouTube lies below the other three ones. What does it mean?