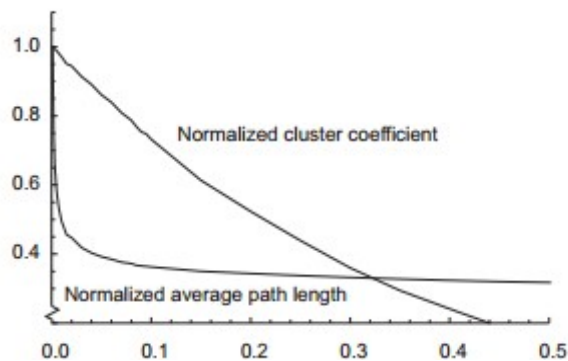


**Peer to Peer Systems 03/02/2014**  
**Master Degree in Computer Science,**  
**Computer Science and Networking, Business Informatics**

- 1) Consider the *Distributed Hash Table CAN (Content Addressable Network)*.
- a) describe and show the application to a concrete case
    - the procedure executed by a node *to join* an already existing CAN overlay
    - the query routing procedure
    - the CAN reorganization procedure executed when a node fails
  - b) let us suppose that we want to reduce the *response time* of the CAN query resolution process. Show at least a possible *strategy to optimize the query routing*. **(10pt)**

2) Show that the clustering coefficient of an  $ER(n;p)$  graph is equal to  $p$ . **(4pt)**

3) For a  $WS(n;k;p)$  graph (Watt Strogatz with  $n$  nodes, each node connected to its  $k$  closer neighbours,  $p$  rewiring probability), we know that the *clustering coefficient* and *average path length* evolve as a function of  $p$ . The following graph shows the clustering coefficient/ the average path length as a function of the rewiring probability. What does this graph tell us? **(6pt)**



4) Consider the Gnutella 0.4 protocol: show its main characteristics and its main drawbacks. Describe the solutions proposed to overcome these problems. **(10pt)**