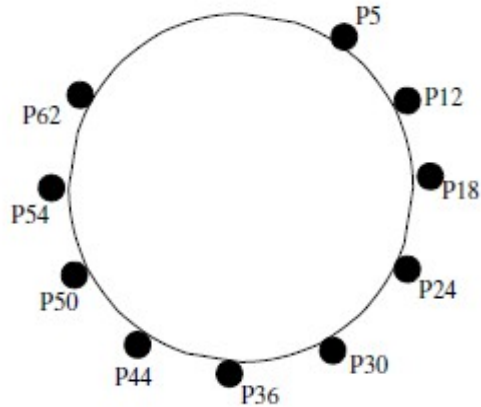# Peer to Peer Systems 12/01/2015
Master Degree in Computer Science, Computer Science and Networking, Business Informatics

1) Consider the following CHORD network with 10 peers. Peer and resource keys are 6-bit identifiers. **(9pt)**

- how many nodes can this system host at most ?(motivate the answer).
- distribute resource keys K10, K23, K35, K36, K49, K55 and K63 to the network.
- write the finger tables of peers P12 and P36.
- peer P42 joins the network. Explain concisely what happens and write the finger table of P36 and P42 after the join.
- peer P44 leaves the network. Explain concisely what happens and write the finger table of P12 after the leave.
- look at the figure with resource keys as described at point 2. Write a routing path from peer P12 to key K55.

3) The definition of an epidemic algorithm requires a service returning a random sample of the nodes. Show a *distributed peer sampling protocol* for P2P systems. **(7pt)**

4) Kademlia is a DHT algorithm which uses *bitwise exclusive or* (XOR) operation as a metrics for node distance. **(7pt)**
- What are the trade-offs in selecting k-bucket sizes for a Kademlia overlay?
- How much memory does the Kademlia routing table consume?
- How does Kademlia compare to other DHTs?

5) Show that, for a graph G $\in$ W(n,k,0), (a Watts Strogatz graph where each node is connected to k neighbours and no rewiring is present), the value of CC(G) is the following one: **(9pt)**

$$CC(G) = \frac{3}{4}\frac{k-2}{k-1}$$