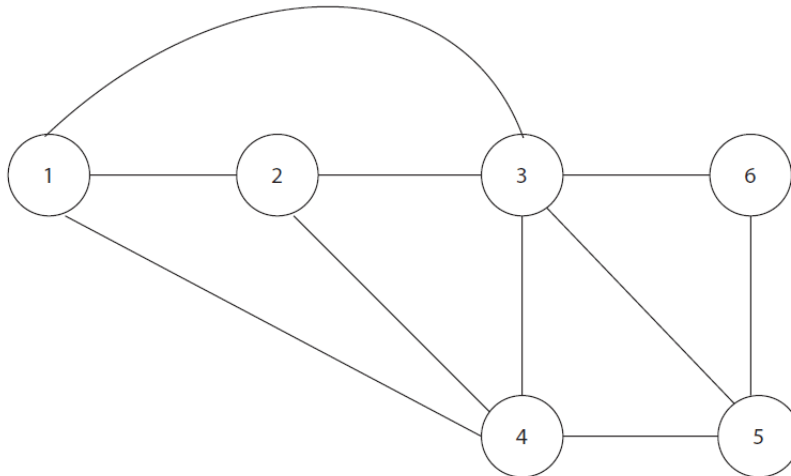
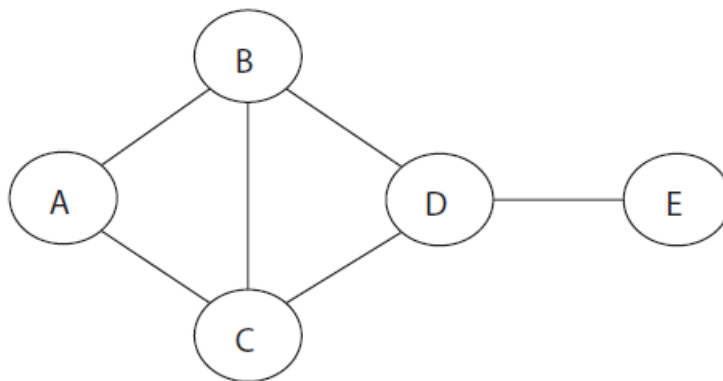


Exercise 5: Routing and Networking

1. Show how a packet that is sent from node 1 with flooding, spread in the network if it is assumed that hop count = 3.



2. In the figure below a simple network is shown. Assume that flooding is used when sending messages from A to E. An upper limit is used in order to reduce the number of packets. Which is the lowest limit that can be used for the number of hops in order for at least one packet to reach node E? Also, calculate the total number of packets that will be sent in the network when using this hop limit.



3. A router uses Distance Vector routing and it has the following routing table:

Net-id	# hops	Router
Net2	6	A
Net3	4	C
Net4	3	A
Net6	2	C
Net7	3	B

The router receives the following update message from router C. Show the router's routing table after the update.

Net-id	# hops
Net2	6
Net3	4
Net4	1
Net6	2
Net7	3

4. A network has 6 links, numbered from 1 to 6, and 4 routers, numbered from A to D. Each link constitutes a unique subnet. The routers use a distance vector based routing protocol. Each link/subnet is connected to max two routers. Subnet 1, 2 and 3 are so called *stub nets*, that is they only connect to one router each. Below are the routing tables for routers A and D.

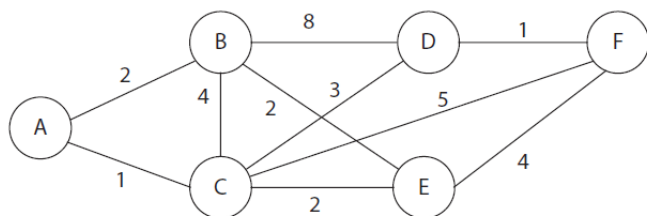
Router A routingtabell			Router D routingtabell		
Nät-id	Kostnad	Nästa nod	Nät-id	Kostnad	Nästa nod
1	1	-	1	2	A
2	4	D	2	3	C
3	2	D	3	1	-
4	3	D	4	2	C
5	2	D	5	1	-
6	1	-	6	1	-

- Sketch the complete network and mark the subnets and routers.
- The network is reconfigured and router A receives a routing update (see below) from a new router E. Show router A's routing table after the update.

Routingmeddelande från router E		
Nät-id	Kostnad	Nästa nod
1	1	-
2	1	-
3	2	B
4	4	B
5	3	A
6	2	A
7	2	B

c. Sketch the new network.

5. The network below uses a link-state based routing protocol. Calculate the shortest-path tree, starting from node A.



6. Assume the Ethernet-based network below. A, B, C and D are hosts. R1 and R2 are routers. DNS is a DNS server and Switch is an Ethernet-switch. A, B, and C have R1 as default gateway, and D has R2 as default gateway. R1 and R2 are configured with static routing information and therefore exchange no routing information.

Which IP packets will be seen at the arrow in the two following cases? Describe the purpose of the frames, MAC addresses (both sender and destination) and IP addresses (sender and destination). Assume that all caches and routing tables are empty in both cases.

- A sends a ping to D. A only knows D via its symbolic address "www.d.se"
- B sends a ping to D. B only knows D via its symbolic address "www.d.se"

