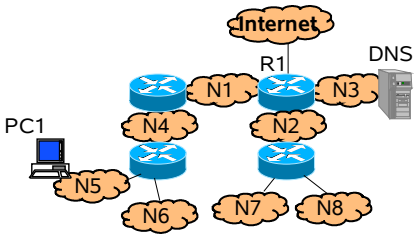
Control de Xarxes de Computadors (XC)	Group MAS – 25/04/2008
NAME:	SURNAME:

Duration: 1 hour. Answer the quiz and the problems in the same sheet.

net	address	mask	net	address	mask
N1	200.0.0.0	255.255.255.252	N5	200.0.0.40	255.255.255.248
N2	200.0.0.4	255.255.255.252	N6	200.0.0.48	255.255.255.240
N3	200.0.0.16	255.255.255.240	N7	200.0.0.64	255.255.255.224
N4	200.0.0.32	255.255.255.248	N8	200.0.0.96	255.255.255.224



Quiz. (5 points) All the questions are multi-answer: 0,5 point if correct, 0,25 if there is one error, 0 otherwise.

1. Say which statements are true regarding the IP network of the figure:
- ☐ In network N1 there are no IP addresses available to add any host.
- ☐ In network N5 we can have at most 5 hosts.
- ☐ All the available IP addresses of network 200.0.0.0/24 have been assigned to the networks N1... N8.
- ☐ Addresses from networks N1 and N2 can be summarized with the IP address 200.0.0.0/29

2. Assume that all routers in the figure use RIP version 2 with split horizon and advertise all the routes in network 200.0.0.0/24. The default route in R1 is also advertised. There are no additional static routes. Say which statements are true:
- ☐ R1 will be sending routing updates with 6 entries to network N2.
- ☐ When routing tables have converged, all routers will have 9 entries in their routing tables.
- ☐ Network N6 with metric 3 will be one of the entries of the update messages sent by R1 into network N1.
- ☐ If the connection to network N3 is lost, R1 will send update messages with network N3, metric 16 to networks N1 and N2.

3. Assume that all ARP caches in the figure are empty, we execute a successful ping 200.0.0.20 at PC1. Say which statements are true after the ping:
- ☐ ARP table of PC1 will have 2 entries.
- ☐ Router R1 will have sent 1 ARP request.
- ☐ In the ARP table of PC1 there will be the IP address 200.0.0.20.
- ☐ There will be 4 ARP resolutions.

4. Say which statements are true regarding DNS in the figure:
- ☐ Each time the DNS server solves a name of foreign domain, it sends a query to a root-server.
- ☐ All the resource records of the zone files of the DNS server must have IP addresses in the network 200.0.0.0/24.
- ☐ PC1 can send a recursive query message to the DNS server.
- ☐ The hosts in the network are likely to be configured with the IP address of the DNS server, possibly obtained by DHCP.

5. Say which statements are true regarding the IP protocol:
- ☐ Each time an IP datagram crosses a router, the TTL field is decremented.
- ☐ The checksum is computed using only the IP header fields.
- ☐ The IP checksum is the 16 bit one's complement of the one's complement sum of all 16 bit words to protect.
- ☐ One of the IP options is called “Record Route”.
- ☐ The “total length” field of the IP header is a field of 16 bits with the length of the datagram, measured in bytes, including internet header and data.

6. Say which statements are true regarding the TCP protocol:
- ☐ One of the TCP flags is the DF flag.
- ☐ The RTO timer is restarted each time an ack is received.
- ☐ The client always crosses the SYN_SENT state.
- ☐ The SYN segments sent by the client always have the ack flag unset.

7. Say which statements are true regarding DHCP:
- ☐ The clients must know the IP address of the DHCP server.
- ☐ The clients always sent the DHCPDISCOVER message with the destination address 255.255.255.255.
- ☐ It can be used to configure the default route.
- ☐ The clients must know the DHCP port used by the server.

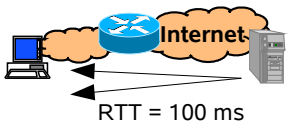
8. Say which statements are true regarding a NAT router:
- ☐ May have to change the checksum of the IP datagrams.
- ☐ May have to change the checksum of the TCP datagrams.
- ☐ May have to change the port of UDP datagrams.
- ☐ If PAT is used, it is no possible to have more that 2^{16} simultaneous connections.

9. Say which statements are true regarding an IP over IP tunnel:
- ☐ The source address in the external header is the the IP address of the tunnel entry point.
- ☐ The addresses in the internal header can be private.
- ☐ ICMP messages generated inside the tunnel will be sent to the router at the entry point in the tunnel.
- ☐ RIP messages can be sent inside a tunnel.

```
...
15:53:13.777675 IP 147.83.34.125.10208 > 130.206.192.15.80: . ack 5793 win 273
...
```

10. Say which of the following segments can be sent by the server after receiving the segment shown in the previous dump:
- ☐ `IP 130.206.192.15.80 > 147.83.34.125.10208: . 5793:7241(1448) ack 578 win 6924`
- ☐ `IP 130.206.192.15.80 > 147.83.34.125.10208: . 4345:5793(1448) ack 578 win 6924`
- ☐ `IP 130.206.192.15.80 > 147.83.34.125.10208: P 8689:9479(790) ack 578 win 6924`
- ☐ `IP 130.206.192.15.80 > 147.83.34.125.10208: . 5773:7221(1448) ack 578 win 6924`

Question 1. (5 points) One host downloads a large file from the Internet. Once the connection has reached the steady state, we observe at the server side that the slow start threshold (ssth) is constant and equal to 2593 bytes, and the transmission window follows a periodic sawtooth shape. We know that the MSS is 1460 bytes, RTT = 100 ms and the RTO ≈ RTT.



1.A Draw a possible evolution of one period of the transmission window. Indicate in the graph: (i) the values that transmission window will take, in bytes, (ii) the time in RTT, (iii) the intervals when TCP is in slow start / congestion avoidance. Explain your assumptions and the events that justify your graph.

1.B Compute the throughput.