

Homework 3

Warning: You have already made the maximum number of submissions. Additional submissions will not count for credit. You are welcome to try it as a learning exercise.

☐ I, Matthew Kramer, certify that my answers here are my own work, and that I completed this in accordance with the Coursera Honor Code.

Question 1

For which of the following services might a virtual circuit network be better than a datagram network?

- ☐ Email
- ☐ File Transfer
- ☐ Web browsing
- ☐ Real time audio communication (e.g. Skype)

Question 2

What is the maximum number of hosts that a subnetwork can handle, if its network prefix is 192.168.176.0/20 ?

- ☐ 2^{12}
- ☐ 2^{20}
- ☐ 2^{16}
- ☐ 20^2

Question 3

The binary notation of an IPv4 address is 11000000101010000000000100100001.
What is its equivalent dotted quad notation?

You may use <http://www.mathsisfun.com/binary-decimal-hexadecimal-converter.html> for conversions from one base to another.

- ☐ 96.40.10.65
- ☐ 192.168.1.33
- ☐ 323.223.58.09
- ☐ 10.123.45.111

Question 4

A router has the following CIDR entries in its forwarding table:

Address/mask	Next hop
135.46.56.0/22	Interface A
135.46.60.0/22	Interface B
135.46.40.0/23	Interface C
default	Interface D

Where does the router forward it, if a packet with the following IP address arrives:

135.46.63.10

- ☐ Interface C
- ☐ Interface D
- ☐ Interface A
- ☐ Interface B

Question 5

A router has the following CIDR entries in its forwarding table:

Address/mask	Next hop
135.46.56.0/22	Interface A
135.46.60.0/22	Interface B
135.46.40.0/23	Interface C
default	Interface D

Where does the router forward it, if a packet with the following IP address arrives:

192.53.56.7

- ☐ Interface D
- ☐ Interface B
- ☐ Interface C
- ☐ Interface A

Question 6

All nodes in a network have been running for a long time when the DHCP server suddenly goes down. What happens to the communication in that network, assuming no new node joins the network.

- ☐ The hosts will continue to communicate normally for a period of time.
- ☐ The nodes will not be able to communicate with any other nodes.
- ☐ The nodes would only be able to communicate outside of their network.
- ☐ The nodes would need to use MAC address to communicate with each other.

Question 7

A route from node Anna to Bella goes via routers R_1 , R_2 , and R_3 . The R_1 – R_2 link has maximum segment size of 1000 bytes, while the R_2 – R_3 link has maximum segment size of 500 bytes. If Anna sends two packets of size 1000 bytes and 1500 bytes respectively, what is the total number of packets received by Bella?

- ☐ 3
- ☐ 5
- ☐ 6
- ☐ 2

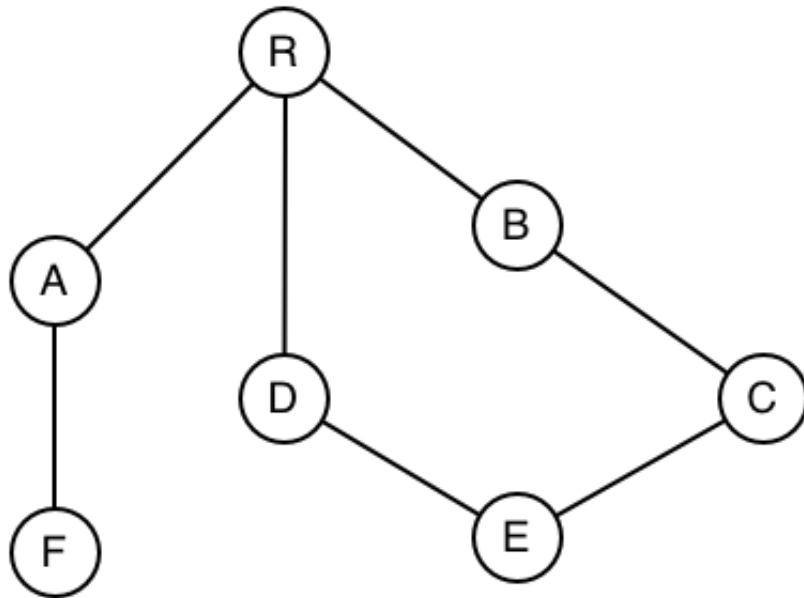
Question 8

Your friend Alice, who is also taking this networking class, comes to you excitedly and says, "If everyone adopts IPv6, we won't need NAT anymore!". Do you agree with her?

- ☐ No, even with IPv6, IP addresses remain a scarce commodity, and hence NAT would still be needed.
- ☐ Yes, because with 128 bit addresses, IPv6 does away with scarcity of IP addresses, thus making NAT redundant.
- ☐ No, IPv6 and Network Address Translation are two entirely different things. What is Alice thinking?
- ☐ Yes, because IPv6 is much more secure than IPv4.

Question 9

Spanning Tree Protocol



In figure, R,A,B,C,D,E and F are nodes on a switched ethernet running the Spanning Tree Protocol. The lines represent the available links between the nodes. Root R has been elected as the root by the protocol.

Which node is the parent of E in the spanning tree decided by the protocol?

- ☐ R
- ☐ C
- ☐ B
- ☐ D

Question 10

A datagram network allows routers to drop packets whenever they need to. The probability of a router discarding a packet is 20%. Consider the case of a source host connected to the source router, which is connected to the destination router, and then to the destination host. If either of the routers discards a packet, the source host eventually times out and tries again. If both host-router and router-router lines are counted as hops, what is ***the expected number of hops a packet makes per transmission?***

Hint: Use the weighted mean of the probability of the packet taking 1,2 or 3 hops.

- ☐ 1.84
- ☐ 2
- ☐ 2.44
- ☐ 0.16

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You cannot submit your work until you agree to the Honor Code at the top. Thanks!
