

Name _____

Student number _____

SE 4C03 Winter 2003

Midterm Test Answer Key

Instructor: W. M. Farmer

You have 50 minutes to complete this test consisting of 6 pages and 18 questions. You may use your notes and textbooks. Circle the *best* answer for the multiple choice questions, and write the answer to the other questions in the space provided. You are welcome to write your answers in pencil. However, the instructor will not remark answers written in pencil if he thinks it is *possible* that the answer was erased and rewritten. Good luck!

- (1) [3 pts.] A token ring network is a connection-oriented technology. Is this statement true or false?
 - (a) True.
 - (b) False.

- (2) [3 pts.] UDP is a more reliable communication protocol than IP. Is this statement true or false?
 - (a) True.
 - (b) False.

- (3) [3 pts.] According to the Bell-LaPadula security model, a top-secret subject is allowed to read and write unclassified objects. Is this statement true or false?
 - (a) True.
 - (b) False.

- (4) [3 pts.] Ethernet is never used for wide area networks. Is this statement true or false?
 - (a) True.
 - (b) False.

- (5) [3 pts.] The purpose of the ICMP protocol is *not* to make IP more reliable?
 - (a) True.
 - (b) False.

- (6) [5 pts.] What protocol is for establishing a virtual connectionless network?
- (a) IP.
 - (b) ICMP.
 - (c) UDP.
 - (d) TCP.
- (7) [5 pts.] In the TCP protocol, what is considered as a possible indicator of traffic congestion?
- (a) An unacknowledged TCP segment.
 - (b) More than 5 dropped TCP packets.
 - (c) The reception of an ICMP source quench message.
 - (d) All of the above.
- (8) [5 pts.] If an Internet host is running TCP/IP and IP forwarding is turned off, then
- (a) The host does not need a routing table.
 - (b) The host cannot send IP datagrams to other Internet hosts.
 - (c) IP datagrams cannot enter and then exit the host.
 - (d) All of the above.
- (9) [5 pts.] Consider an Ethernet network composed of six network interfaces connected to a single hub. (There are six such networks in the Little Internet.) How many collision domains does this network have?
- (a) 0.
 - (b) 1.
 - (c) 2.
 - (d) 6.
- (10) [5 pts.] A security posture in information security is analogous to a(n) _____ in software development.
- (a) Requirements specification.
 - (b) Design document.
 - (c) Implementation.
 - (d) Maintenance record.

- (11) [5 pts.] Suppose that a process would like to transmit one octet of data to another process using UDP. How many UDP datagrams would normally be needed to perform the transmission?
- (a) 1.
 - (b) 2.
 - (c) 4.
 - (d) 8.
- (12) [5 pts.] Suppose that a process would like to transmit one octet of data to another process using TCP. How many TCP segments would normally be needed to perform the transmission?
- (a) 1.
 - (b) 3.
 - (c) 4.
 - (d) 8.
- (13) [5 pts.] Financial institutions are naturally most concerned about the _____ of their data.
- (a) Privacy.
 - (b) Integrity.
 - (c) Availability.
 - (d) None of the above.
- (14) [5 pts.] Explain with exactly one sentence the purpose of the loopback network interface.

Answer: The loopback network interface enables TCP/IP to be utilized on a computer with no physical network interfaces.

- (15) [5 pts.] What characteristic distinguishes a TCP segment that “requests” a TCP connection from any other TCP segment.

Answer: The ACK bit of a TCP segment that requests a TCP connection is set to false, while the ACK bit of any other TCP segment is set to true.

- (16) [5 pts.] Suppose that there is a TCP connection between A and B and that A has just sent five TCP segments S_1, \dots, S_5 to B whose sequence number fields contain 34456, 34578, 34672, 34790, 35155, respectively. After receiving S_1, S_2, S_4 but not S_3, S_5 , B sends a TCP segment T to A . What number will be in acknowledgement number field of T ?

Answer: 34672.

(17) [10 pts.] Consider a subnet whose subnet address is 202.111.96.0 and whose subnet mask is 255.255.224.0.

(a) How many IP addresses are members of this subnet?

Answer: $2^{5+8} = 2^{13}$.

(b) How many class networks are subsets of this subnet?

Answer: 2^5 class C networks.

(18) [20 pts.] Recall that a route in a subnet routing table has the form (a, m, r, i) where:

- a is the address of a subnet S .
- m is the mask of S .
- r is an IP address for the “next hop” ($r = *$ for direct routes).
- i is an interface.

Refer to the diagram of a conventional internet using the TCP/IP protocols (which is not shown). H_1, \dots, H_4 are hosts. l_1, \dots, l_{11} are interfaces to the single physical networks SPN_1, \dots, SPN_8 . J_1, \dots, J_4 are interfaces to loopback networks. There are other hosts and interfaces that are not shown in the diagram. The following table shows what IP addresses and subnet masks are assigned to the l_1, \dots, l_{11} interfaces.

Interface	IP Address	Subnet Mask
l_1	199.56.78.111	255.255.255.128
l_2	199.56.78.134	255.255.255.128
l_3	199.56.78.136	255.255.255.128
l_4	67.40.30.210	255.0.0.0
l_5	67.40.45.17	255.0.0.0
l_6	180.86.87.53	255.255.0.0
l_7	180.86.89.21	255.255.0.0
l_8	211.209.139.55	255.255.255.192
l_9	211.209.139.66	255.255.255.192
l_{10}	211.209.139.144	255.255.255.192
l_{11}	211.209.139.211	255.255.255.192

Write down the routing table for H_3 as a list of (a, m, r, i) tuples. Do not use a default route or any host-specific routes, and keep the number of indirect routes as small as possible.

Answer:

(127.0.0.0,	255.0.0.0,	*	J ₃)
(67.0.0.0,	255.0.0.0,	*	I ₅)
(180.86.0.0,	255.255.0.0,	*	I ₆)
(199.56.78.0,	255.255.255.0,	67.40.30.210,	I ₅)
(211.209.139.0,	255.255.255.0,	180.86.89.21,	I ₆)