Name _____

Student number _____

SE 4C03 Winter 2007

Midterm Test Answer Key

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You have 50 minutes to complete this test consisting of 7 pages and 26 questions. You may use your notes and textbooks, but you may not use any calculators or other electronic devices. Circle the *best* answer for the multiple choice questions, and write the answer in the space provided for the other questions. Good luck!

(1) [2 pts.] Today there is not much reason to purchase an Ethernet hub instead of an Ethernet switch. Is this statement true or false?

    (a) True.

    (b) False.

(2) [2 pts.] UDP has about the same overhead as TCP. Is this statement true or false?

    (a) True.

    (b) False.

(3) [2 pts.] The Internet has always been under the control of the U.S. government. Is this statement true or false?

    (a) True.

    (b) False.

(4) [2 pts.] The number of IP addresses in a subnet is always a power of 2 (i.e., 2^n for some $n \geq 0$). Is this statement true or false?

    (a) True.

    (b) False.

(5) [2 pts.] Every computer that routes packets has at least one IP address assigned to it. Is this statement true or false?

    (a) True.

    (b) False.

(6) [2 pts.] Ephemeral UDP and TCP ports are sometimes assigned to server processes. Is this statement true or false?

(a) True.

(b) False.

(7) [2 pts.] When an IP datagram's time-to-live field becomes 0, the IP datagram is returned to its source address encapsulated in an ICMP message. Is this statement true or false?

(a) True.

(b) False.

(8) [2 pts.] The `traceroute` program is implemented using the ICMP `ping` service. Is this statement true or false?

(a) True.

(b) False.

(9) [2 pts.] Which combination of code bits would normally not be found in a TCP packet?

(a) `SYN=0, ACK=0`.

(b) `FIN=1, ACK=0`.

(c) `SYN=1, FIN=1`.

(d) All of the above.

(10) [2 pts.] Which of the following files is the most dangerous?

(a) `-rwsr-xr-x root bozos 40552 5 Dec 11:06 passwd`.

(b) `-rwxrwxrwx root bozos 40552 5 Dec 11:23 passwd`.

(c) `-r-sr-xr-x bozo admin 40552 5 Dec 11:39 passwd`.

(d) `-r-sr-xrwx root admin 40552 5 Dec 11:56 passwd`.

(11) [2 pts.] Which network technology can be used for both LANs and WANs?

(a) Ethernet.

(b) FDDI.

(c) ATM.

(d) All of the above.

(12) [2 pts.] Which of the following protocols is largely obsolete today?.

   (a) ARP.

   (b) $\boxed{\text{RARP.}}$

   (c) UDP.

   (d) None of the above.

(13) [2 pts.] Which of the following is not a standard internetworking convention?

   (a) There is one subnet of addresses assigned to each SPN.

   (b) A subnet mask has the form $11 \cdots 100 \cdots 0$.

   (c) The broadcast address of a subnet is the address in the subnet whose interface bits are all 1s.

   (d) $\boxed{\text{IP forwarding is activated on any computer with at least one physical network interface.}}$

(14) [2 pts.] A TCP segment's initial sequence number is

   (a) 0.

   (b) 1024.

   (c) $\boxed{\text{Chosen randomly.}}$

   (d) The next unused number between 0 and $2^{32} - 1$.

(15) [2 pts.] What is the maximum number of times that an IP datagram will undergo fragmentation if it crosses n SPNs before it is delivered?

   (a) 1 time.

   (b) $n - 1$ times.

   (c) $\boxed{n \text{ times.}}$

   (d) $2n$ times.

(16) [2 pts.] The address of the loopback network is

   (a) $\boxed{\text{127.0.0.0.}}$

   (b) 127.0.0.1.

   (c) 127.0.0.0 or 127.0.0.1.

   (d) 127.255.255.255.

(17) [2 pts.] An acknowledgment of a TCP segment is *ambiguous* if

    (a) The acknowledgment was received just after the timer for the segment expired.

    (b) The segment was retransmitted before the acknowledgment was received.

    (c) The segment was retransmitted after the acknowledgment was received.

    (d) The segment has been acknowledged more than once.

(18) [2 pts.] The TCP protocol assumes the loss of a segment is caused by

    (a) Temporary router malfunction.

    (b) Network overload.

    (c) Routing table misconfiguration.

    (d) The lost of an IP datagram fragment.

(19) [2 pts.] Which of the following cannot be easily spoofed?

    (a) An IP datagram's source address.

    (b) The domain name of an IP datagram's source host.

    (c) The interface at which an IP datagram arrived.

    (d) None of the above.

(20) [2 pts.] Which TCP code bit is a signal to send a TCP segment before it is filled?

    (a) `URG`.

    (b) `RST`.

    (c) `PSH`.

    (d) `FIN`.

(21) [5 pts.] What are the subnet address and the subnet mask of the subnet of all possible IP addresses?

Answer:

- Subnet address: 0.0.0.0.
- Subnet mask: 0.0.0.0.

(22) [5 pts.] Name three connection-oriented communication systems.

Answer:

1. The telephone system.
2. An ATM computer network.
3. The TCP protocol running on an internet or computer network.

(23) [5 pts.] Name three connectionless communication systems.

Answer:

1. The mail system.
2. An Ethernet network.
3. IP running on an internet.

(24) [5 pts.] What is data integrity?

Answer: Data integrity is the state in which data has not been accidently or maliciously modified or destroyed.

(25) Suppose you have just joined a company that has a class B network of IP addresses. Every SPN in the company is assigned a subnet of addresses, and the mask of each subnet is 255.255.252.0. You have been given a desktop computer connected to an SPN S, one of the company's SPNs. The IP address assigned to your computer is 158.217.69.56.

(a) [5 pts.] Write your computer's IP address in binary (base 2).

Answer: 10011110.11011001.01000101.00111000.

(b) [5 pts.] What is the subnet address of the subnet assigned to S in decimal (base 10)?

Answer: 158.217.68.0.

(c) [5 pts.] What is the maximum number of interfaces that can be on S?

Answer: $2^{10} - 2$.

(d) [5 pts.] What is the maximum number of SPNs that the company can have?

Answer: 2^6.

(26) [20 pts.] Below is a diagram of a conventional internet using the TCP/IP protocols.

THE DIAGRAM IS NOT SHOWN.

$H_1, \ldots, H_5$ are hosts. $I_1, \ldots, I_{11}$ are interfaces to the single physical networks $SPN_1, \ldots, SPN_6$. $J_1, \ldots, J_5$ are interfaces to loopback networks. There are other hosts and interfaces that are not shown. The following table shows what IP addresses and subnet masks are assigned to the $I_1, \ldots, I_{11}$ interfaces.

Interface	IP Address	Subnet Mask
I_1	201.148.30.34	255.255.255.224
I_2	201.148.30.80	255.255.255.224
I_3	201.148.30.81	255.255.255.224
I_4	201.148.30.38	255.255.255.224
I_5	201.148.30.45	255.255.255.224
I_6	201.148.30.100	255.255.255.224
I_7	201.148.30.135	255.255.255.224
I_8	201.148.30.172	255.255.255.224
I_9	201.148.30.111	255.255.255.224
I_{10}	201.148.30.187	255.255.255.224
I_{11}	201.148.30.193	255.255.255.224

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.

Write down an appropriate routing table for H_1 as a list of (a, m, r, i) tuples. *Do not use a default route or any host-specific routes.*

Answer:

(127.0.0.0,	255.0.0.0,	*,	J_1)
(201.148.30.32,	255.255.255.224,	*,	I_1)
(201.148.30.64,	255.255.255.224,	*,	I_2)
(201.148.30.96,	255.255.255.224,	*,	I_6)
(201.148.30.128,	255.255.255.224,	201.148.30.81,	I_2)
(201.148.30.160,	255.255.255.224,	201.148.30.38,	I_1)
(201.148.30.192,	255.255.255.224,	201.148.30.38,	I_1)