CMSC 417 Computer Networks **Fall 2019**

First Third-Term Exam

Closed book and notes; In class *Thursday, Sep. 26th*

⊕ *Do not forget to write your name on the first page. Initial each subsequent page.*
⊕ *Be* **neat** *and* **precise**. **I will not grade answers I cannot read.**
⊕ *You should draw simple figures if you think it will make your answers clearer.*
⊕ *Good luck and remember, brevity is the soul of wit*

- All problems are mandatory
- I cannot stress this point enough: **Be precise**. If you have written something incorrect along with the correct answer, you should **not** expect to get all the points. I will grade based upon what you **wrote**, not what you **meant**.
- Maximum possible points: 50 + bonus.

Name: _____

Problem	Points
1	
2	
3	
4	
5	
Total	

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	2	4	8	16	32	64	128	256	512	1024	2048	4096	8192	16384	32768	65536

1. Nomenclature

   (a) Describe the following terms: (2 points each)

   - Autonomous System

   - Subnetting

   - Transit AS

   - Default Route

   - Class C IP address

2. Routing

(a) List one advantage and one disadvantage of Link State routing over Distance Vector (2 points)

(b) How sequence numbers used in Link State Routing? (2 points)

(c) How is Split Horizon different from Poisoned Reverse? Explain with an example. (3 points)

(d) What is a "periodic update" in Distance Vector. Are they necessary? Why or why not? (3 points)

3. Internet Protocol

(a) Suppose you are allocated the prefix 111.222.3.4/25.

i. How many IP addresses do you control? (1 point)

ii. Divide your allocation into three subnets, two of equal size and one double the size of the others. For each subnet, list the following: (3 points)

	Subnet-id	Mask	Broadcast	# hosts	Highest Address	Lowest Address
Subnet 0						
Subnet 1						
Subnet 2						

(b) Suppose a IP fragment with ID 1023, offset 128, MF=0, DF=0, TTL=17 and payload size 532 bytes is transmitted on a link with MTU 276 bytes. List the header values for the resultant fragments. You may assume no IP options; IP Len includes header. You may assume that link MTU of x means an IP datagram of total length x can be sent over the link. (3 points)

	IP ID	Offset	MF	DF	TTL	IP Len.
Fragment 0						
Fragment 1						
Fragment 2						

(c) IP reassembly code receives a datagram with previously unseen Identification=32317, Total Len **1023** bytes, MF flag=1, and offset=**8191**. How should this datagram be processed. (3 points)

4. CIDR, BGP

(a) What is the difference between a *stub* and *multi-homed AS*? (2 points)

(b) Provider P has four customers with allocations 112.8.32/8, 112.8.33/8, 112.8.34/8, and 112.8.35/8. What CIDR prefix should P advertise. (2 points)

(c) UMD has two providers, Cogent and Comcast. What techniques can can UMD use to ensure that its outgoing traffic to the Internet (but not to Comcast customers) is carried by Cogent? (3 points)

(d) How can UMD ensure that most of its incoming traffic is carried by Comcast instead of Cogent. (3 points)

5. Mobile IP, Implementation

   (a) Describe Proxy ARP. (2 points)

   (b) (How) is "tunneling" used in Mobile-IP? (2 points)

   (c) Function `Read` is supposed to read `n` bytes on TCP socket `s`, and return a buffer `b` or NULL on error. The socket descriptor and number of bytes is input to `Read`. Show an implementation of `Read`.