

## First Third-Term Exam

Closed book and notes; In class

Thursday, Oct. 5th

- ⊕ 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)

- Reliable Flooding

- IP Anycast

- Home Agent

- Route Reflector

- ICMP Echo Message

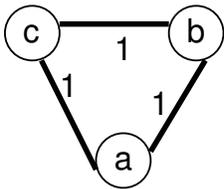
2. Routing

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

(b) How is TTL used in Link State Routing? (2 points)

(c) What desirable property does Poisoned Reverse guarantee? (2 points)

(d) Assume the link between **a** and **c** breaks. If only best paths were kept, would this “triangle” graph require periodic updates for Distance Vector to route around the failure? Explain. (4 points)



3. Internet Protocol

(a) Suppose you are allocated the prefix 212.55.31/23.

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 32317, offset 400, MF=0, DF=0, TTL=17 and payload size 300 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.(3 points)

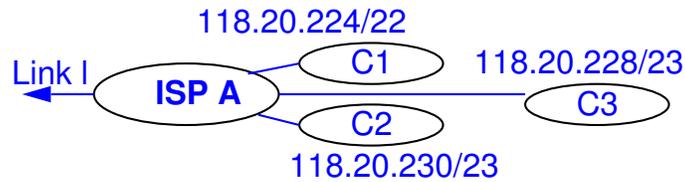
	IP ID	Offset	MF	DF	TTL	IP Len.
Fragment 0						
Fragment 1						
Fragment 2						

(c) How is `traceroute` implemented? (3 points)

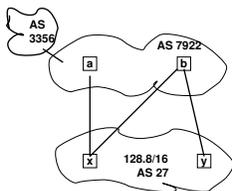
4. CIDR, BGP

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

(b)  $C_i$  are customers of ISP A with the address allocations as shown. Is it correct for A to advertise routes to 118.20.228/19 to the Internet? Explain Why or why not? (2 points)



(c) AS 27 originates 128.8/16, via BGP speakers/gateways **x** and **y** to provider AS7922. AS7922 also receives routes for 128.8/16 via *its* provider AS3356. (How) can AS7922 ensure that the direct link to AS27 (if available) is used for traffic destined to 128.8/16? (3 points)



(d) How can AS27 request that the **b** to **y** link be preferred for all incoming traffic to 128.8/16 (3 points)

5. Mobile IP, Implementation

- (a) How does a Mobile-IP Home Agent ensure that it receives all packets that were destined to the mobile host's permanent address? (2 points)

- (b) What is "tunneling"? How and where is it used in Mobile-IP? (1+2 points)

- (c) Function `Read` is supposed to read `n` bytes on socket `s`, and return a buffer `b`. List at least 4 errors in `Read`. (3 points)

```
char *Read(s, n){
    int i = 0 ; char *b;
    while (i < n) {
        i+=read(s, b+i, n);
    }
    return b;
}
```

- (d) Suppose `Read` was written correctly (i.e. it read `n` bytes on socket `s` without error.) Could you use `Read` to implement a non-blocking read for `n` bytes using `select` or `poll`? Show your implementation, or state why not. (2 points)