

Second Third-Term Exam

*Open book and notes; In class**Tuesday, November 22nd*

- ⊕ *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.

Name: _____

Problem	Max	Points
1	10	
2	10	
3	10	
4	20	
Total	50	

1. TCP, IP Routing

(a) How many global addresses does an organization have if its ISP provides it with a CIDR address block of 128.6.32.55/21. Show how you derived your answer. (2 points)

(b) How did the IP and TCP header need to be changed to accommodate CIDR? Why? (2 points)

(c) Why is the TIME-WAIT state needed in TCP? (3 points)

(d) What is the `Identification` field in IP used for? (3 points)

2. DNS, SMTP/MIME, FTP

(a) Give realistic examples of different types of mappings between IP addresses and DNS names (one-to-one, many-to-one, etc.) (4 points)

(b) How are MX records used in sending mail? (3 points)

(c) What is the PORT command in FTP used for? (3 points)

3. Chord

- [illegible]

(d) Internet Services

- i. Suppose I run a FTP server S within corporation X. X's security policy mandates that all of its hosts be behind a NAT. Server S should be accessible to all hosts within X and also from the outside world. Describe one way to set up the different networking components (server S, the NAT between X and the Internet, DNS, machines within X, etc.) such that this is possible. (6 points)
- ii. Suppose you want to launch a large Internet-based service, and have distributed a number of servers (say 100) at different points in the network. Ideally, you'd want the load on these servers to be balanced. Sketch one way you might accomplish this. (6 points)

- iii. Now suppose that the service you provide is latency critical, and you want clients to go to the *closest* server. List two reasonable distance metrics in this context (using which closest might be defined), and describe how you might augment your solution to direct clients to the closest server (with respect to at least one of your metrics)