

## Second Third-Term Exam

*Closed book and notes; In class**Thursday, November 13th*

- ⊕ *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	Points
1	
2	
3	
4	
5	
Total	

1. Congestion Control, Address Translation

(a) What is *slow start*? (2 points)

(b) Can more than 64K TCP connections be supported through a single NAT? Precisely explain when this is and is not possible. (3 points)

(c) Upon detection of loss, how is the TCP congestion window adjusted with and without *fast recovery* implemented. (5 points)

## 2. Domain Name System

- (a) Give an example of a DNS answer that is *always* authoritative. (2 points)
- (b) What is a *cut* in the DNS namespace? (2 points)
- (c) Suppose you send mail to `bobby@cs.umd.edu`. Enumerate steps that are undertaken that involve the DNS. Assume you are in a different domain, and that nothing is cached. (6 points)

### 3. Network Layer Protocols

- (a) The IP packet header *fragment offset* field is only 13-bits long, while IP packets themselves can be up to 64Kbytes long. Is there a problem here? If yes, how is it addressed? (3 points)
  
  
  
  
  
  
  
  
  
  
- (b) How does BGP avoid routing loops in AS-level paths? (2 points)
  
  
  
  
  
  
  
  
  
  
- (c) Explain with a small example the notion of *parent routers* in reverse path forwarding. Why are they needed and how are they chosen? (5 points)

#### 4. Application-layer Protocols

- (a) **ftp** using a single control connection and multiple data connections. State one advantage and one disadvantage of this scheme. (2 points)

- (b) HTTP/1.0 is often considered inefficient. Why? (3 points)

- (c) Early **netscape** browsers tried to solve the problems of HTTP/1.0 by opening multiple simultaneous connections. Why is this a good or bad idea? (5 points)

## 5. Application-layer Protocols (2)

- Describe a method by which arbitrary binary data can be transported through mail gateways that can only handle 7-bit ASCII characters. (3 points)
- Outline the method by which news is propagated using NNTP. (3 points)
- In your project, the TTP sends a `inventory` message after a successful transaction that changes the inventory of the specified party (say A). What signatures/ hashes must this message include and why? (4 points)