

## Second Third-Term Exam

*Closed book and notes; In class**Thursday, April 15th*

- ⊕ *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.*
- ⊕ *Don't forget to file your taxes or at least an extension.*
- ⊕ *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. Describe the following terms (2 points each)

(a) DNS Resolver

(b) DNS Zone

(c) Slow Start

(d) File Swarming

(e) FQDN

## 2. Transport Protocols

- (a) What invariant does a sliding window sender assert? (Describe your terms) (2 points)
- (b) Describe the state transitions and messages sent during a TCP simultaneous open. (3 points)
- (c) You receive a UDP segment with checksum equal to zero. What does this mean? (3 points)
- (d) What is the maximum safe send window size with a  $2^{32}$  byte sequence number space? (2)

### 3. TCP

(a) How does Fast Recovery improve TCP performance? (3 points)

(b) Other than at the beginning, when is slow-start required during a TCP connection? (3 points)

(c) Describe the “silly window syndrome” in TCP. (4 points)

## DNS

- (a) What role do root servers play in DNS name resolution? (3 points)
- (b) How does the `hosts.txt` file interact with DNS name resolution? (2 points)
- (c) Describe the steps involved in delegating a DNS zone. (5 points)

## 4. Application-layer Protocols

- (a) What are the hashes in a torrent (meta-data) file and how are they used? (3 points)
- (b) How is an MX record used in SMTP? (3 points)
- (c) What is the percentage overhead of transmitting 999 bytes of binary data in Base-64 encoding?  
Show your work.(2 points)
- (d) How many connections from two local devices can a single NAT device sustain to a single web server? (2 points)