

Second Third-Term Exam

*Open book and notes; In class**Tuesday, Nov. 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)

- Chord Finger Table

- Stop-and-wait ARQ

- DNS Authoritative Answer

- DNS Glue Record

- NAT

2. Reliable Transfer/UDP

- (a) What are the send and receive window sizes in the “Go-back N” protocol? (2 points)

- (b) What service(s), beyond checksumming, does UDP provide over IP? (2 points)

- (c) What is the maximum end-to-end throughput you could achieve on a 10Gbps, 25ms RTT link, with send window-size ≤ 40 maximum-sized segments, segment size ≤ 1250 bytes. Show your work. (3 points)

- (d) Give an example where a sliding window transfer protocol that uses 7 sequence numbers fails when $RWS = 4$, $SWS = 3$. Explain your assumptions. (3 points)

3. DNS/Application-Layer

- [illegible]

4. TCP

- (a) What header field(s) are used in TCP congestion control? How? (1+2 points)

- (b) Why would a TCP Window Scale value of 16 be incorrect? (2 points)

- (c) What are the constraints on TCP timestamps (in terms of how slowly and how quickly they can increase)? (1+2 points)

- (d) Describe the TCP `TIME_WAIT` state. Why is it required? Are there cases when both TCP endpoints enter `TIME_WAIT`? (2 points)

5. Applications/Design

- (a) Describe the DNS queries involved in the various ways an SMTP server may validate the sender of an email. (3 points)
- (b) Explain why HTTP 1.1 added support for persistent connections. What is a draw back of such support? (2+1 points)
- (c) Provide an implementation for `void advance_window(int *l, int *r, int seq)`. `l` and `r` refer to the left and right edges (inclusive) of the sender's window (used as both input/output). `seq` contains the sequence number for the latest ACK from the receiver. Assume the window size is defined as `WIN_SIZE`, with sequence numbers ranging from 0 to `WIN_SIZE-1`. (4 points)