

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)

- Sender Policy Framework (SPF)

- Selective Ack

- Distributed Hash Table

- Nameserver

- Slow Start

2. Reliable Transfer/UDP

- (a) What are the send and receive window sizes in the “Alternating Bit 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 1Gbps, 250ms RTT link, with send window-size ≤ 4 maximum-sized segments, segment size ≤ 125 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 flow 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) How is a MX record used in SMTP? (1 points)
- (b) Suppose all DNS servers form a Chord ring and names are resolved using Chord. Discuss two positives and two negatives of such a design. (4 points)
- (c) Provide an implementation for `dispatch(int s0, int s1)`. Descriptors `s0` and `s1` are connected TCP sockets. `dispatch` should call a function `process(int s)` on sockets `s0` and `s1` when they are ready to be read without blocking. If both are ready, `s0` should be processed first and then `s1`. (5 points)