CMSC 417 Computer Networks **Fall 2017**

Second Third-Term Exam

Open notes; In class *Tuesday, November 21st*

⊕ *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. Nomenclature

   (a) Describe the following terms: (2 points each)

   - Glue record

   - Silly Window Syndrome

   - Cumulative Ack

   - Finger Table

   - Base-64 Encoding

2. Reliable Transfer/UDP

(a) What is the TCP service model? (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, 100ms RTT link, with send window-size ≤ 4, packet 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. TCP

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

(b) The maximum window scaling defined in TCP increases the window sizes by 2^{14}. Would 2^{15} or even 2^{16} be reasonable? Explain. (3 points)

(c) (How) does the TCP Window Scale option affect performance? Explain with an example. (4 points)

4. DNS/Application-Layer

   (a) You administer the `umd.edu.` domain, and want to delegate the `a.umd.edu.` subdomain. Explain what records you would add to your zone to enable this. (2 points)

   (b) Why does a NS record contain a name as opposed to a IP address? (2 points)

   (c) Why did HTTP-proxies present a problem when HTTP (version 1.1) (or keepalive connections) were introduced? (2 points)

   (d) When might a mail server issue a reverse DNS query? What additional protections (if any) do SPF records provide beyond such queries? (1+3 points)

5. Design (Choices)

(a) Nameserver s queries d for DNS name `fb.com` over UDP. What prevents some other (rogue) host r on the Internet from supplying a (perhaps incorrect) answer to s? (2 points)

(b) What steps can r take to improve its probability of success? (2 points)

(c) Describe one mechanism that would reduce the probability of success for the attack described above to below 2^{-160}.(3 points)

(d) Suppose all DNS servers form a Chord ring and names are resolved using Chord. Discuss two positives and two negatives of such a design. (3 points)