

Final Exam

*Closed book and notes; In class**Monday, December 19th*

- ⊕ *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*
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- 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: 60

Name: _____

Problem	Points
1	
2	
3	
4	
5	
6	
Total	

1. IP, Routing

(a) What is *split horizon*? How does it work? (3 points)

(b) What problem does *CIDR* solve? Explain with an example.(3 points)

(c) Good ISP X owns address block 80/8. Misguided ISP Y starts advertising a false route to 80/8 by mistake. What can ISP X do in the short term to ensure that its customers can still be reached?(4 points)

2. Multicast/DNS

(a) Give an example of the use of *parent routers* in Reverse Path Forwarding. (3 points)

(b) The IP address for `bowman.cs.umd.edu` is `128.8.128.147`. In class, I mistakenly tried to look up the PTR record for `in-addr.arpa.147.128.8.128`. What should I have looked up instead? Why? (3 points)

(c) How does the correct DNS query for the PTR record pointing to `bowman.cs.umd.edu` get resolved?(4 points)

3. Transport-layer Protocols

(a) Is the *Alternating Bit Protocol* resilient to packet reordering? Explain with an example.(3 points)

(b) What is the TCP *silly window syndrome*? What algorithm is used to ensure that TCP is not affected by it?(3 points)

(c) Suppose you want to design a transport protocol for streaming audio. Should this protocol be reliable? Why or why not? (4 points)

4. Application-layer Protocols

(a) Explain how a bounded-degree multicast can be implemented over *is*. (4 points)

(b) Does a HTTP proxy have to know whether persistent connections are in use? Why or why not? (3 points)

(c) Why is the PASV command not needed in HTTP (but is useful in FTP?) Explain. (3 points)

5. MAC Layer protocols/Error Correction

(a) What is the *exposed node problem* in wireless LANs? How is it solved? (3 points)

(b) For what length burst is the probability of error in a CRC maximum? Why? (3 points)

(c) Consider the generator polynomial (the divisor in the CRC) $x^5 + x^4 + x + 1$. Show that this polynomial will be able to detect all odd number of errors in a transmission. Note: $x^5 + x^4 + x + 1 = (x^4 + 1)(x + 1)$. Be precise. (4 points)

6. Design

- The current Usenet news service requires human intervention to set up newsfeed, and an infrastructure investment in news servers and storage space. Consider a completely distributed, decentralized re-design where news is not propagated via the server network, but is instead obtained entirely using peer-to-peer techniques (e.g. using a DHT). Describe the design of such a protocol, and the (dis)advantages of such a change. In particular, your answer should include:
 - The components of your new architecture, and their functionality
 - A description of how the set of newsgroups is propagated
 - A description of how articles are posted
 - A description of how articles are obtained, and how the reader knows what articles are available in each group

Clearly, I am not looking for a “perfect” and necessarily complete protocol. I do want you to (1) consider the merits and demerits of your protocol, e.g. is it more or less resilient to random node failures, uses more or less bandwidth and storage, etc. and (2) to impress upon me that you understand which issues are trivial and which are difficult (possibly unsolvable). (10 points)