

## Final Exam

*Open book and notes**Saturday, December 14th*

- ⊕ *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)

- Hidden Node

- CIDR

- Resource Record

- Frequency Shift Keying

- Blockchain

## 2. Network and Transport

- [illegible]

### 3. MAC protocols, Error Detection

- (a) Why does a 802.11 node that joins the network have to wait DIFS time before transmitting even if the medium is free? Describe in terms of the states other nodes may be in. (2 points)
- (b) Why does Ethernet (802.3) require a minimum payload size? Explain. (2 points)
- (c) 00 10 01 11 11 00 is received. The original was encoded using Hamming codes as discussed in class. Is this message correct? If not, which bit is in error? Show your work. (3 points)
- (d) Assume a CRC polynomial  $x^3 + x + 1$ . What should be transmitted for message 00100100. Show your work. (3 points)

## 4. Applications

- (a) What mechanism does Bluetooth use to coordinate medium access amongst many (pairs of) devices? (2 points)
  
  
  
  
  
  
  
  
  
  
- (b) How does this work when two devices are connected? (2 points)
  
  
  
  
  
  
  
  
  
  
- (c) We want to implement support for a DHT-based *tracker* for BitTorrent. Assume we have a DHT that provides operations such as  $\text{Get}(\text{Key}) \rightarrow \text{Value}$  and  $\text{Append}(\text{Key}, \text{Value})$ . What should change in the torrent file to support this? (2 points)
  
  
  
  
  
  
  
  
  
  
- (d) Explain how the client would use the DHT operations and results to initiate a BitTorrent download. (4 points)

## 5. Applications

- [illegible]