Midterm Solutions: CS425 FA15

1. (Solution and Grading by: Alex Zahdeh)
   1.1. d
   1.2. b
   1.3. c
   1.4. d
   1.5. c
   1.6. d
   1.7. a
   1.8. c
   1.9. b
   1.10. a
   1.11. c

2. (Solution and Grading by: Qi Wang)
   (1)

   (2)
   pairs with same timestamp:
   (P2,1), (P4,1)
   (P1,3), (P2,3)
   (P2,3), (P4,3)

   pairs with different timestamps:
   (P1,3), (P4,1)

3. (Solution and Grading by: Yi Zhang)
   (1)
4. (Solution and Grading by: <Guangxiang Du>)
   1. 1
   2. [1,1,2,1]
   3. 1
   4. [1,1,1,1]
   5. [1,1,2,1]
   6. 4

5. (Solution by: Indy and Grading by: Ayush Jain)
a. Each process/node routes Election messages to id 0. This will route to the lowest id node, which knows it’s the new leader and which then responds back with Ok messages. Everyone who receives Ok messages knows that the originator is the new leader. The algorithm elects the right leader (safety), and since DHT routing works (if finger tables are correct), it completes.

b. Completion time: $O(\log(N))$. Number of messages $O(N\log(N))$

c. Same as a, except that the lowest id process relays the Election message to its predecessor, which in turn sends the Ok’s back. Argument for safety and liveness is same.

d. Completion time: $O(\log(N)+1) = O(\log(N))$. Number of messages $O(N\log(N))$. 