ECE 454 Assignment 2

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1. As we can see in the image below we have a network with 5 peers and we want to go from node 0 to node 7. [image q1 here]

   In this network the finger table of node 0 would look like: $FT[0] = 4, FT[1] = 4, FT[2] = 0$ which means our next hop would be to node 4. This means that we would have the following situation.

$$p = 0, q = 4, k = 7$$

$$q - p = 0 \; and \; k - p = 3$$

$$q - p \geq \frac{k - d}{2}$$

$$0 \geq \frac{3}{2}$$

   Therefore the equality does not hold.

2. (a)

   (b) Only the predecessor to the item that is being inserted needs to be updated, not including the joining node. For a total of 1 node.

3. For this solution we need to introduce a couple of new

4. For this solution we need to introduce a few new functions. First we will introduce a$itob()$ function that converts an integer to its binary representation. We will need the reverse of that function $btoi()$. We will also need a $concat()$ function that will combine two binary values ie. $Concat(100, 010)$ should result in 100010. We will also need the reverse of the concat function, we will call it $split()$ which takes one binary value and splits it down the middle and returns the two tokens ie. $[b1, b2] = split(someBinaryString)$, where $b1$ and $b2$ are the most significant and least significant bits respectively.

   $(i, j) \rightarrow n$

$$n = btoi(concat(itob(i), itob(j))$$

   $n \rightarrow (i, j)$

$$[b1, b2] = split(n)$$

$$i = btoi(b1)$$

$$j = btoi(b2)$$

5. There are two possible ways that a route can be created between Q and P either Q chooses P or P chooses Q. The total number of routes are $\binom{n-1}{c-1}$

$$\therefore P = \frac{2}{\binom{n-1}{c-1}}$$

6.

7.