ECE363 Assignment 3

Student ID:

1. Consider IP address X: 193.101.50.44/26

   (a) Which of the IP addresses below is on the same network as X (5 points):

 | IP address | On the same network as X (Yes or No)? |
   |---|---|
   | 193.101.50.10 | |
   | 193.100.50.11 | |
   | 193.101.50.65 | |

   (b) With subnet mask 255.255.255.192, what is the maximum number of hosts on the subnet? (5 points)

2. An IP packet has the following information in its header arrives at a WLAN:

...	length	ID	fragflag	offset	...
	5000	x	0	0	

   Since the maximum transmission unit (MTU) of the WLAN is 2308 bytes, the packet will be fragmented into how many packets? What will be the length, ID, fragflag and offset values in their IP headers? (10 points)

3. The number shown in the following figure is the probability of the link failing. It is assumed that links fail independently of each other.
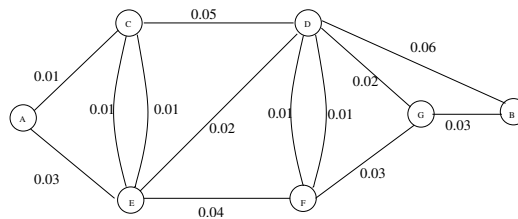

   (a) Find the most reliable path from A to B, i.e., the path for which the probability that all links stay intact is maximal. [Hint: for link i with failing probability $p_i \ll 1$ and link j with failing probability $p_j \ll 1$, $\Pr\{\text{fail of the path through link i and link j}\} = 1 - (1 - p_i)(1 - p_j) = p_i + p_j - p_i p_j \approx p + p$] (5 points)

Iterations	A	B	C	D	E	F	G
Initially	(0, A)	(∞, .)	(0.01, A)	(∞, .)	(0.03, A)	(∞, .)	(∞, .)
1							
2							
3							
4							
5							
6							

(b) Find the second most reliable path from A to B which does not share any link belonging to the path found in (a). (5 points)

4. (Bonus Questions:) In the network shown in the following figure, a routing protocol based on distance vector algorithm is used. Routers exchange distance vectors every 30 seconds. During each round, the sequence that the routers send out distance vectors is X, Y, Z, W. The number shown in the figure is the cost of each link, and routers try to use the path with the minimum cost to deliver packets. Assume at time t_0, the cost between X and Y is increased from 4 to 60.
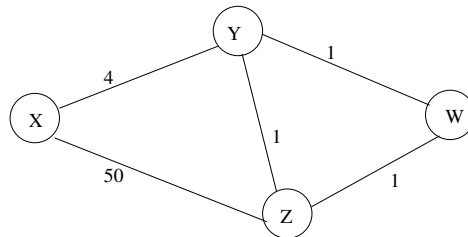
(a) If **no** poisoned reverse is used, what will be the distance vectors from Y to X after one, two, and three distance vectors exchanges between neighbors? (5 points)

From Y to X	neighbor X	neighbor W	neighbor Z
initially	$4 \to 60$	6	6
after 1st exchange			
after 2nd exchange			
after 3rd exchange			

(b) If poisoned reverse is used, what will be the distance vectors from Y to X after one, two, and three distance vectors exchanges between neighbors? (5 points)

From Y to X	neighbor X	neighbor W	neighbor Z
initially	$4 \rightarrow 60$	∞	∞
after 1st exchange			
after 2nd exchange			
after 3rd exchange			