**ISE 316 Homework #4**

**Introduction to Networking**

**Spring 2023**

**Stony Brook University**

**Rubrics: 30 pts**

1. (4 pts) Let’s assume a router has the following routing table:

Address/mask    Next hop  
135.46.56.0/22   Interface 0   
135.46.60.0/22   Interface 1  
192.53.40.0/23   Router 1   
default                Router 2

Describe how the forwarding table above determines the appropriate link  
interface for datagrams with destination addresses:

1. 135.46.63.10
2. 135.46.57.14
3. 135.46.52.2
4. 192.53.40.7
5. 192.53.56.7

Hint: convert the addresses to binary and use the longest prefix matching.

1. (2 pts) Assume the generator polynomial G(x)= x^5+x^4+x^2+1 is used. Determine whether the received message 11100011010110 has detectable errors or not.
2. (2 pts) Let M(x) = 11000101110 be the message transmitted by a sender on a network. However, the receiver received the message C’(x) = 11010011111. Compute the error polynomial. Show that the error will not be caught by CRC using the following generator 1101111.

# (10 pts) Show the steps of Vector Distance (Bellman-Ford) and Link State (Dijkstra’s Algorithm) computing the least cost paths from B to all other nodes. Use the same method we used in class. Show your tables as I showed you in class.

Diagram, shape, arrow

Description automatically generated

1. (3 pts) Consider a router that interconnects three subnets: Subnet 1, Subnet 2, and Subnet 3. Suppose all the interfaces in each of these three subnets are required to have the prefix . Also suppose that Subnet 1 is required to support at least 20 interfaces, Subnet 2 is to support at least 50 interfaces, and Subnet 3 is to support at least 9 interfaces. Provide three net- work addresses (of the form a.b.c.d/x) that satisfy these constraints.
2. (4 pts) Below is a graph showing the changes in the congestion windows size  
   of a TCP Reno connection over time. There are several places in this graph where the congestion window size changes abruptly. In particular, four points have been labeled below using A to D. Explain what happened to the TCP connection at each of the labeled points in the graph that caused the abrupt changes in congestion window size.

A picture containing diagram

Description automatically generated

1. (5 pts) Consider sending a 1500-byte datagram into a link passing through two routers W, U. Assume that the subnet where A is connected has an MTU of 600 bytes and the subnet where B is connected has MTU of 400 bytes. Suppose the original datagram is stamped with the identification number 144. How many fragments are generated between A and B when passing through W and U? What are the values in the various fields in the IP datagram(s) generated related to fragmentation?