CMPT 371 Summer 2019: Homework Assignment 4 (25 Points)
Available: July 2, 2019
Due Date: July 16, 2019

Q1. **Network Address Translation.** You are interested in detecting the number of hosts behind a NAT. You observe that the IP layer stamps an identification number sequentially on each IP packet. The identification number of the first IP packet generated by a host is a random number, and the identification numbers of the subsequent IP packets are sequentially assigned. Assume all IP packets generated by hosts behind the NAT are sent to the outside world. Based on this observation, and assuming you can sniff all packets sent by the NAT to the outside, can you outline a simple technique that detects the number of unique hosts behind a NAT? How? **(5 points)**

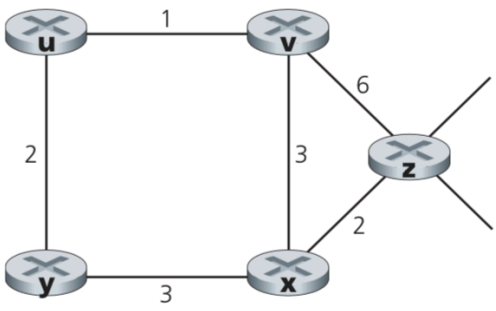
If the identification numbers are not sequentially assigned but randomly assigned, would your technique work? Why? **(5 points)**

Q2. Switch Fabric. Suppose two packets arrive to two different input ports of a router at exactly the same time. Also suppose there are no other packets anywhere in the router.

Suppose the two packets are to be forwarded to two **different** output ports. Is it possible to forward the two packets through the switch fabric at the same time when the fabric uses a shared bus? How about when switching via memory?

Now, suppose the two packets are to be forwarded to the **same** output port. Is it possible to forward the two packets through the switch fabric at the same time when the fabric uses a crossbar? **(5 points)**

Q3. Distance Vector. Consider the network shown below and assume that each node initially knows the costs to each of its neighbors. Consider the distance-vector algorithm and show the distance table entries at node *z*. **(5 points)**



Q4. Count to Infinity. Will the count-to-infinity problem in the distance vector routing occur if we decrease the cost of a link? Why? How about if we connect two nodes which do not have a link? **(5 points)**

Please submit your answers in pdf format, before the midnight on July 16, 2019 on the canvas system HW4 activity.