CARLETON UNIVERSITY
School of Computer Science

COMP3203– Principles of Computer Networks
Assignment 3

Instructor: Prof. AbdelRahman Abdou

Winter 2022

The assignment is **worth 3.64%** of the total course grade. It is graded out of 25, so your mark will be scaled accordingly.

You should submit a PDF document with your solutions in the respective assignment dropbox on cuLearn. For example, if you use MS Word, save it as PDF and upload. Name the PDF file as:

"A#_FirstName_LastName_StudentNumber.pdf"

So if John Smith, whose number is 123456789, is uploading the solution for Assignment 3, John should name the file "A3_John_Smith_123456789.pdf".

Make sure you upload your solution before the deadline, which is at **11:59pm EST on Mar 8th**. As usual, feel free to ask questions on our Brightspace forum.

Distribution of Marks

Question	Points	Score
1	10	
2	15	
Total:	25	

1. Suppose a device in Halifax, Nova Scotia is sending back-to-back packets to another in Coleraine, United Kingdom. Each packet travels through the *EXA North and South* submarine cable, at a propagation speed that is two-thirds the speed of light. Each packet is 1,200 bytes. Assume the cable's transmission rate is 10 Gbps (10×10^9 bits per second).

   (a) (10 points) How big would the window size have to be for the channel (sender) utilization to be at least 20 percent?

2. Consider a device, D, sending five TCP segments to another device. D measures the RTT of each packet, `SampleRTT`, as part of its regular TCP procedure to calculate the TCP timeout interval, `TimeoutInterval`. Suppose that the five measured `SampleRTT` values are 98ms, 95ms, 120ms, 110ms, and 75ms.

   (a) (5 points) Compute the `EstimatedRTT` after each of these `SampleRTT` values is obtained, using a value of $\alpha = 0.125$ and assuming that the value of `EstimatedRTT` was 100ms just before the first of these five samples was obtained.

   (b) (5 points) Compute the `DevRTT` after each sample is obtained, assuming a value of $\beta = 0.25$ and assuming the value of `DevRTT` was 5ms just before the first of these five samples was obtained.

   (c) (5 points) Compute the TCP `TimeoutInterval` after each of these `SampleRTTs` is obtained.