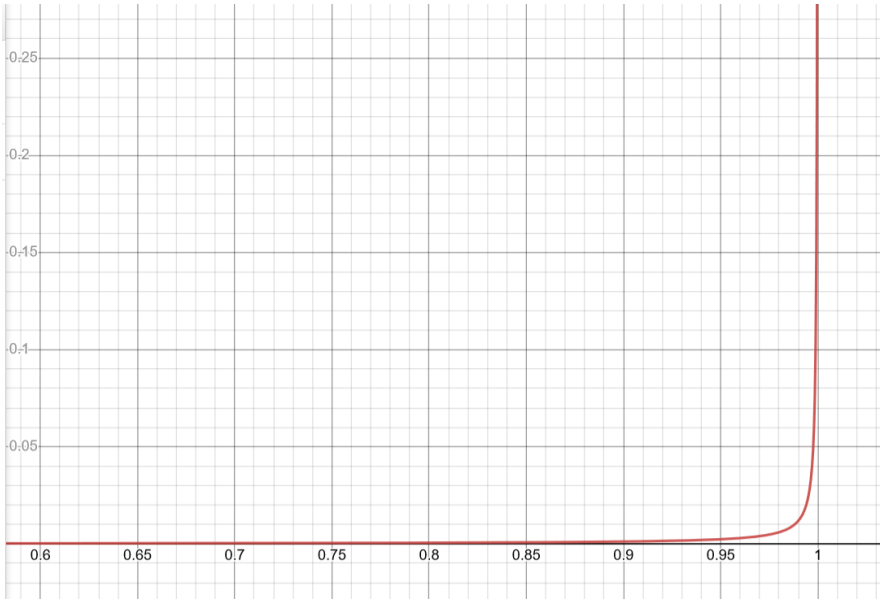
CSE3300/CSE5299: Computer Networking
Homework 2

1.

a. All packets consist of L = 1500 Bytes which is 12000 bits and R = 100Mbps which is 10^8bits. The total delay is transmission delay (L/R) + queuing delay $(\frac{I}{1-I} * \frac{L}{R})$. When I = 0, it is just transmission delay, which is L/R = $\frac{12000}{10^8}$ which is 0.00012s.

b. 

Made using the equation y = $\frac{L}{R} + \frac{I}{1-I} * \frac{L}{R}$, where I is the x-axis. I cut off before 0.6 as the total delay was still very close to 0.00012s, up until I was more than 0.9.

2. The packets are technically sent through a “pipeline” when sent, meaning that in order to get all the packets sent, we can send the first packet, then once it reaches the first router, the next packet can be sent. As a result, the first packet needs a transmission time of 3 and subsequent packets only need one, meaning the equation we use for total time taken is $3\,Tt\ +\ (N\ -\ 1)\ *\ 1Tt\ which\ is\ (N\ +\ 2)\ *\ Tt$ where N is the number of packets and Tt is the transmission time.
F = 80,000 bits and R = 1000000bps

S = 1000: 1000 Bytes = 8000 bits, total packets = $\frac{F}{S} = \frac{80000}{8000} = 10\ packets$, size of one packet = 8040 bits, Tt = $\frac{size\ of\ packet}{R} = \frac{8040}{1000000} = 0.00804$,
$(N\ +\ 2)\ *\ Tt$ = (12) * (0.00804) = 0.09648s
S = 100: 100 Bytes = 800 bits, total packets = $\frac{F}{S} = \frac{80000}{800} = 100\ packets$, size of one packet = 840 bits, Tt = $\frac{size\ of\ packet}{R} = \frac{840}{1000000} = 0.000804$, $(N\ +\ 2)\ *\ Tt$ = (102) * (0.000804) = 0.0857s

3. If the loss probability is p =(0<p<1), then that would mean the success probability is (1-p). If each link is independent, then you would multiply each probability with itself for the amount of links, and there are 10 links, so it would be probability = $(1\ -\ p)^{10}$.

4.

1. My computer as well as the server is running HTTP 1.1, seen through the HTTP/1.1 200 OK messages and GET requests.
2. It says it accepts English, seen through the Accept-Language: en-US
3. My IP is 192.168.86.23 while the server’s is 34.107.221.82, seen through source and destination of the GET request
4. HTTP/1.1 200 OK (text/html), meaning that what I requested was there and sent back to me.
5. It was last modified “Date: Mon, 19 Sep 2022 11:15:14 GMT\r\n”
6. My browser is receiving “File Data: 90 bytes”, a second message shown is “Content-Length: 90\r\n”, also showing 90 bytes
7. All of the headers seem to be able to be found in the packet content window