CNT5505 Homework No. 6

(Given November 27, due December 4)

(Note: you can either do this as an individual homework or form a group of 2 to do this homework.)

1. Assume the network topology in Lecture 1, Slide 5. Describe all major activities at all layers on all related machines and routers when a process on 128.226.9.14 sends 100 Byte data through TCP to a process on 128.226.1.8.

2. Why does UDP exist? would it not have been enough to just let user processes send raw IP packets?

3. Both UDP and TCP use port number to identify the destination entity when delivering a message. Give two reasons why these protocols invented a new abstract ID (port numbers) instead of using process IDs, which already existed when these protocols were designed.

4. Consider the effect of using slow start on a line with a 10-msec round-trip time and no congestion. The receive window is 24KB and the maximum segment size is 2KB. How long does it take before the first full window can be sent?

5. Suppose that the TCP congestion window is set to 20KB and a timeout occurs. How big will the window be if the next four transmission busts are all successful? assume that the maximum segment size is 1KB.

6. If the TCP round-trip time (RTT) is currently 30 msec and the following acknowledgements come in after 26, 32, 24 msec, respectively, what is the new RTT estimate using the Jacobson algorithm? Use α=0.9 or x=0.9.

7. A TCP machine is sending full windos of 65,535 bytes over a 1-Gbps channel that has 10-msec one way delay. What is the maximum throughput achievable? What is the line efficiency?