1. (5 points). Consider a 150 Mb/s link that is 800 km long, with a queue large enough to hold 5,000 packets. Assume that packets arrive at the queue with an average rate of 40,000 packets per second and that the average packet length is 3,000 bits.

    Approximately, what is the propagation delay for the link (be sure to include the units in your answer)?

    What is the transmission time for an average length packet?

    What is the traffic intensity?

    What is the average number of packets in the queue?

    What is the average number in the queue, if the average arrival rate is 80,000 packets per second?

2. (5 points) A user in Atlanta, connected to the internet via a 5 Mb/s connection retrieves a 50 KB (B=bytes) web page from a web server in Denver, where the page references 4 images of 300 KB each. Assume that the one way propagation delay is 20 ms.

Approximately how long does it take for the page (including images) to appear on the user's screen, assuming persistent HTTP?

How long would it take using non-persistent HTTP (assume a single connection)?