**Network Architectures 3329**  **Name:** ⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯

**Spring 2018**  **Homework 1**

**01/26/2018**  **Due 02/02/2018**

- **Print** your name.

- Homework submitted in class in a timely fashion. Check `https://cis.temple.edu/~tug29203/18spring-3329/index.html` for late policy.

| Problem | Points | Score |
|---------|--------|-------|
| 1 | 3 | |
| 2 | 7 | |
| Total: | 10 | |

1. **Written questions (essay, computational)** Suppose Host A wants to send a large file to Host B. The path from A to B has three links, of rates $R_1 = 500kbps$, $R_2 = 2Mbps$, and $R_3 = 1Mbps$

   (a) (1 point) Assume no other traffic in the network, what is the throughput for the file transfer?

   > **Solution:** $500kbps$

   (b) (2 points) Suppose the file is 4 million bytes. Dividing the file size by the throughput, roughly how long will it take to transfer the file to Host B?

   > **Solution:** $4\ million\ bytes/500\ kbps = 4000 \times 8\ kb/500\ kps = 64\ seconds$

2. **Written questions (essay, computational)** Suppose users share a 2 Mbps link. Also suppose each user transmits continuously at 1 Mbps when transmitting, but each user transmits only 20 percent of the time.

   (a) (2 points) When circuit switching is used, how many users can be supported?

   > **Solution:** 2

   (b) (2 points) For the remainder of this problem, suppose packet switching is used. To prevent queuing delay, what is the maximum number of users that can transmit at the same time?

   > **Solution:** 2

   (c) (1 point) Find the probability that a given user is transmitting.

   > **Solution:** .2

   (d) (2 points) Suppose now there are three users. Find the probability that at any given time, all three users are transmitting simultaneously. Find the fraction of time during which the queue grows.

   > **Solution:** $(.2)^3 = .008$