# Homework 1

*Due: 12 March 2021*

v20210310-1930

## Problem 1.1

Hosts A and B follow a connect/disconnect protocol that is supposed to use three-way handshakes as outlined in Section 5.3.2 of the book. Suppose host A sends a connection request to host B, which is (correctly) acknowledged by B, but A is not ready to actually send data yet, so it decides not to respond. What would happen? What state do A and B think the connection is in?

What happens if A then changes its mind and initiates the disconnect part of the protocol—how would B respond?

## Problem 1.2

Suppose we're joining a TCP stream already in progress. Host G composes a segment with SYN=900, ACK=22500, which is 200 bytes long, and Host H composes a segment with SYN=22500, ACK=900, which is 1000 bytes long. They are sent at the exact same moment, so that they cross paths in transit.

was: *SYN=23000, ACK=750*

- Based only on this information, what can/can't you say about the previous segments that were sent by each?

Formerly: *Assuming that there have been no packets dropped by lower layers, what does this imply …*

*Before either arrives*, each host composes and sends another segment of exactly 100 bytes.

*After a further pause*, long enough for the 100-byte segments to arrive on both sides, Host G sends an additional segment of 200 bytes, and *after* that arrives, Host H composes and sends a segment of 500 bytes.

- Draw a diagram illustrating the entire interaction, labeling each segment with its SYN and ACK values and its size.
- Assuming that all the sequencing above was incidental (i.e. that neither process was specifically *waiting* for an incoming segment before

sending something, just that it happened to shake out that way), explain what would change about the diagram if the 100-byte segment from H to G were lost in transit. Which segments would that change (and how)? What would each process do differently later as a result?

## Problem 1.3

You're the sysadmin for a small college network. In the main administration building there are about a hundred computers. In the four main classroom building are about 100 each plus another 200 in offices scattered across campus. Students in the dorms could have as many as 4500 machines. In addition, the computer server room itself has a few dozen machines.

Due to a complete network overhaul, you are now responsible for designing a new network and requesting IP addresses.

At a high level, how would you set up the network? How many addresses would you request? Give one possible range of addresses you could be awarded. What would the net mask be? What kind of subnets would you make, and what would they look like? How much does your answer have to change if you account for wireless devices? Explain your reasoning behind each answer.