

Spring 2009 – 22c:086 Networking & Security for Informatics  
Assignment #3 Due by 11:59pm on Thursday, April 9.

**Problem 1: TCP variations [30 points]** In the following problems, an example scenario should include the timeline diagram used in the lecture.

**Problem 1a: nothing to lose [10 points]** Imagine that there is infinite buffer in every router in the Internet and there is no routing error, so no packets get lost. Describe how to offer reliable data transfer with sequence number, integrity check and acknowledgement, with at least one example scenario with packet corruption. Do NOT use the timeouts.

**Problem 1b: all or nothing [10 points]** Imagine that there is no reordering or corruption in the Internet. Every segment that is sent by the source(sender) either gets delivered to the destination(receiver) or gets lost on the way. Describe how to offer reliable data transfer with timeout and acknowledgement, with at least one example scenario with packet loss. Do NOT use sequence numbers or integrity checks.

**Problem 1c: more smartly [10 points]** Describe how to offer reliable data transfer with sequence number, timeout, and acknowledgement in the imaginative network described in problem 1b, with at least one example scenario with packet loss. Explain what improvements you can expect by adding the sequence number.

**Problem 2: IP addresses [20 points]** Play with the IP subnet calculator at <http://www.subnet-calculator.com/> and answer the following questions.

**Problem 2a [10 points]** Let's say you have an organization with 1000 employees, so you need at least 1000 IP addresses. What network class(es) can you use? If there is more than one class you can use, list them all and compare.

**Problem 2b [5 points]** Let's say you have 10 branches, so you want to have 10 subnetworks inside your network. Does it change your answer to 2a? Explain why.

**Problem 2c [5 points]** Click on CIDR tab and read the bottom part about "IP Address Aggregation". Explain why having fewer entries in the routing table is good.

**Problem 3: IP routing [15 points]** Describe step by step how to build a routing table for node A in this network using Dijkstra's algorithm.

