CptS 455
First Midterm – Sample Exam
September 25, 2009

This is a closed book, closed notes, exam. You may use a calculator if you wish, but it should not be necessary. Read and follow the instructions for each problem carefully. I'm not trying to trick you but the instructions are an important part of the problems!

1. Problem 1 was not applicable for the material covered this year

2.(20 pts) In column A, number the protocol layers named in column B in order from 1, for the "lowest" to 5 for the highest.

A	B	C
	Application layer	web page serving
	Physical layer	operates between directly connected hosts
	Transport layer	primarily characterized by electrical or optical signalling techniques
	Network layer	reliable bytestream delivery to applications
	Link layer	deliver datagrams across multiple connected links

Draw a line connecting each protocol layer name in column B to the *one best* corresponding description or characteristic in column C.

3. (24 pts) Consider a communication link with round-trip latency of 80 msec., and bandwidth 1 Mbit/s. Assume that the transmission time (but not the latency!) for ACKs/NAKs is 0. If a sender sends 800 bit packets what is the *maximum* bandwidth that can be achieved using (show your work)

a. stop-and-wait

b. go-back-N

c. selective repeat

What is the required *window size* in order to achieve the maximum bandwidth for

a. stop-and-wait

b. go-back-N

c. selective repeat

4. (5 points) Draw a simple diagram illustrating the respective roles of *protocols* and *interfaces* in achieving communication between applications running on two different computers. (This does not need to be complicated and it does not need to show anything except your understanding of the difference between protocols and interfaces.)

5.(27 points) In column A number the socket-related system calls named in column B in the order that they are executed in a basic, non-forking, TCP server. If a system call is not a socket-related system call, or is not used in a TCP server leave column A blank in that row.

A	B	C
	open	specifies whether socket is of datagram type or bytestream type
	close	indicates application is finished using the socket
	send and recv	not a socket-related system call
	socket	takes as a parameter an address, usually on a different host, with which to initiate communication
	connect	operations that preserve message boundaries from sending application to receiving application
	sendto and recvfrom	may send fewer bytes than requested. Amount of data received in one operation is unrelated to amount sent in any one operation
	listen	takes a listening socket as a parameter and returns a new socket as its result
	accept	assigns a local address to a socket
	bind	Tells the operating system it should allow connections to be made to a socket.

Draw a line connecting each system call in column B to the best matching description or characteristic of that system call in column C.