1. [20 pt] List and explain the levels in the TCP/IP protocol stack. Why do we want to look at internet communication in this way?

2. [20 pt] Telnet works over TCP, DNS works over UDP. Explain why the developers of each chose those transport protocols?

3. [20 pt] Explain the similarities and the differences between the way that TCP handles Flow Control and Congestion Control. How deterministic is each of these [how much does each KNOW about the factor being controlled]?

4. [20 pt] Write a server program (either in C or in Java) which reads from port 5093 a binary integer [in network order], multiplies it by 3 and adds 2, and sends it back to the port. [Be careful of endianness!!] [In the sockaddr.in struct, set the sin_addr to the constant INADDR_ANY.]

5. [20 pt] Explain (with appropriate formulae) how TCP sets the time-out interval based on network conditions.
struct sockaddr_in {
    short sin_family; u_short sin_port; struct in_addr sin_addr;
};

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#include <sys/socket.h>
#include <fcntl.h>
#include <unistd.h>

int   socket (int af, int type, int protocol);
int   bind (int s_fd, struct sockaddr *name, int namelen);
int   listen (int s_fd, int backlog);
int   connect (int s_fd, struct sockaddr *name, int namelen);
int   accept (int s_fd, struct sockaddr *peer, int *namelen);

int   read (int fildes, char buffer[], int nbyte);
int   write (int fildes, char buffer[], int nbyte);
int   close (int fildes);
import java.io.*;
import java.net.*;

class ServerSocket
    public ServerSocket (int port);
    public Socket accept ();

class Socket
    public java.io.InputStream getInputStream ();
    public java.io.OutputStream getOutputStream ();

class InputStreamReader extends Reader
    public InputStreamReader (java.io.InputStream);

class BufferedReader extends Reader
    public BufferedReader ();
    public String readLine ();

class DataOutputStream
    public DataOutputStream (java.io.OutputStream);
    public void writeBytes (String);

class String
    public String toUpperCase ();