CpSc 360, Section 2, Fall 2008, Midterm Exam

4:00PM ~ 5:15PM, Wednesday, October 1

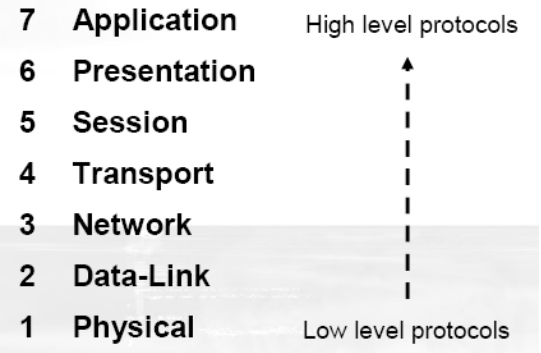
Name:_____ CU User ID:_____

Question #1 (15 points): Determine whether the following statements are true or false.

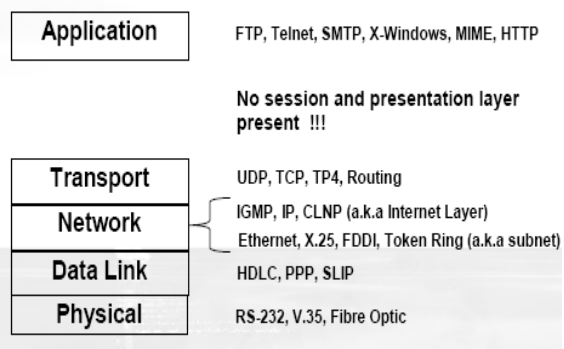
1. Peer processes use interface protocols to communicate in a layered communication model. (FALSE)
2. Network byte order might be different in different computers. (FALSE)
3. IP provides connectionless, unreliable delivery of IP datagrams. (TRUE)
4. Every Ethernet interface has a unique 48 bit address. (TRUE)
5. TCP/IP address consists of IP address and port number. (FALSE)
6. RARP is used by diskless workstations to find their IP addresses. (TRUE)
7. TCP initial sequence number starts at 1. (FALSE)
8. bind() is usually used in server side TCP socket program to fill the local and remote IP addresses of the specific socket file descriptor. (FALSE)
9. In connected UDP socket program, UDP client uses connect() to send its IP address and port to the server. (FALSE)
10. TCP server uses accept() fill the remote IP address and port fields of the file descriptor structure opened by socket(). (FALSE)
11. TCP is a reliable connection oriented protocol while IP is not. (TRUE)
12. Calling bind() is necessary in a UDP client program. (FALSE)
13. In UDP program, unless you do something special, recvfrom() doesn't return until there is a datagram available. (TRUEE)
14. You cannot use read() and write() to in UDP program for client/server communication You must use sendto() and recvfrom() instead. (FALSE)
15. TCP uses send and receive buffers to accomplish flow control. (TRUE)

Question #2 (10 points): Name the 7 layers in OSI reference model, from the lowest layer to the highest. What are the differences between the Internet layering and OSI reference model?

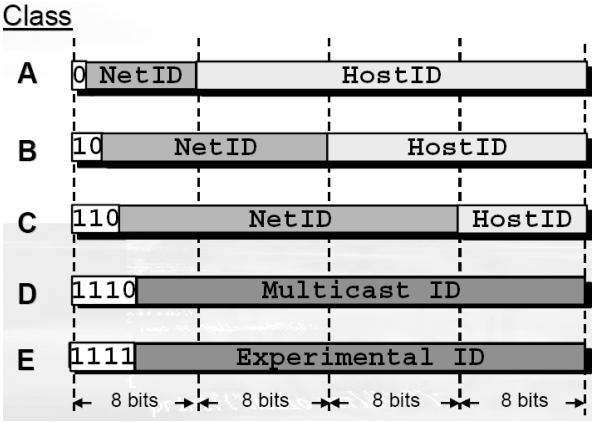
OSI Reference Model:



Internet Layers:



Question #3 (10 points): Draw pictures to demonstrate different formats of IPv4 address classes.



Question #4 (10 points): Briefly describe the difference between IP, TCP, and UDP protocols.

IP:

- network layer protocol
- unreliable datagram delivery between hosts.

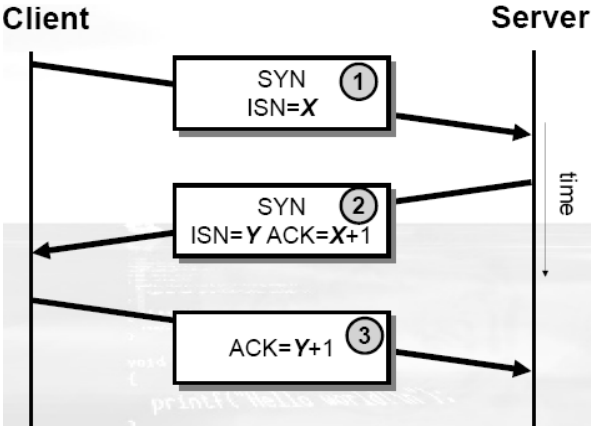
UDP:

- transport layer protocol
- unreliable datagram delivery between processes.

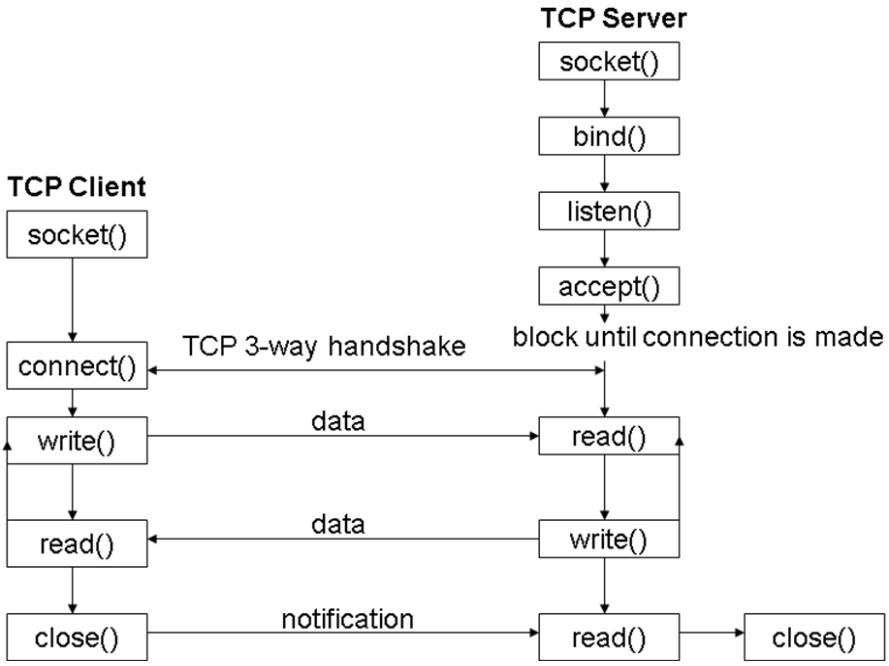
TCP:

- transport layer protocol
- reliable, byte-stream delivery between processes.

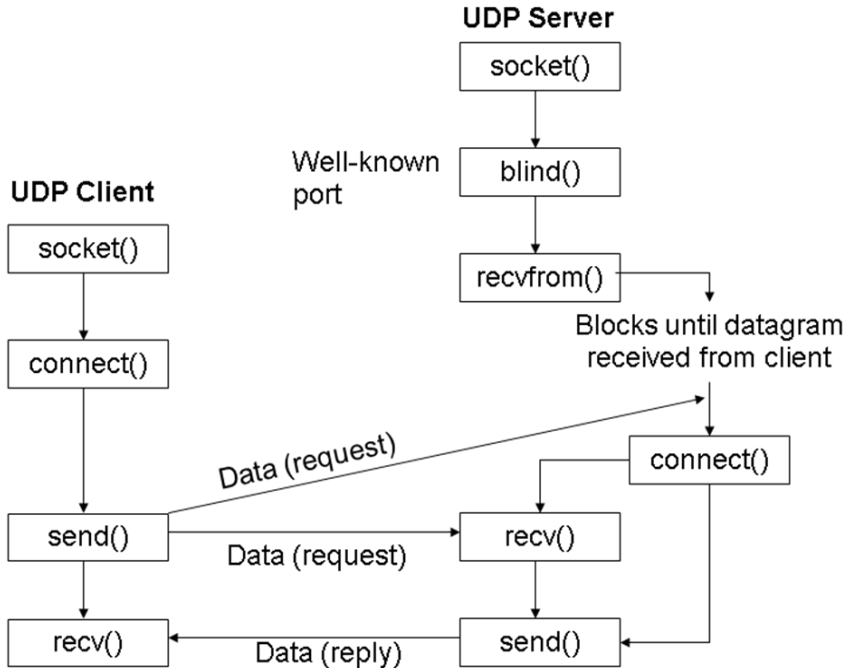
Question #5 (10 points): Draw a diagram to demonstrate TCP 3-way handshake.



Question #6 (15 points): Draw a diagram to demonstrate the detailed communication between TCP client and server processes. You need to show what functions are called in both processes and what information is sent from one side to the other.



Question #7 (15 points): Draw a diagram to demonstrate the detailed communication between connected UDP client and server processes. You need to show what functions are called in both processes and what information is sent from one side to the other.



Question #8 (15 points): There are a few serious problems with the following TCP server program. Please point them out and explain why they are problems.

```
#include <stdio.h>     /* standard C i/o facilities */
#include <unistd.h>    /* Unix System Calls */
#include <sys/types.h> /* system data type definitions */
#include <sys/socket.h> /* socket specific definitions */
#include <netinet/in.h> /* INET constants and stuff */
#include <arpa/inet.h> /* IP address conversion stuff */

int main() {
  int sock_fd, sd, addrlen,length, n;
  struct sockaddr_in skaddr,  from;
  char buff[100];

  if ((sock_fd = socket( PF_INET, SOCK_STREAM, 0 )) < 0) {
    perror("Problem creating socket\n");
    exit(1);
  }

  skaddr.sin_family = AF_INET;
  skaddr.sin_addr.s_addr = htonl(INADDR_ANY);
  skaddr.sin_port = htons(0);

  if (bind(sock_fd, (struct sockaddr *) &skaddr, sizeof(skaddr))<0) {
    exit(0);
  }

  if (listen(sock_fd,5) < 0 ) {
    exit(1);
  }

  while (1) {

    if ( (sd = accept( sock_fd, (struct sockaddr*) &from, &addrlen)) < 0) {
      exit(1);
    }

    while ((n=read(sock_fd,buff,100))>0) {
      write(1,buff,n);
    }

    close(sock_fd);
  }
}
```

Missing a statement:
addrlen = sizeof(from);

"sd" should be used here, not "sock_fd".