CNT 5715 Network Programming

Fall 2007 **Name: _____**

Midterm **Last 5 digits of SSN**: xxx-x __-__ __ __ __

This is an OPEN textbook, but CLOSED notes test. You may consult your textbook for syntax questions. No other reference materials are allowed to be open. There are 9 questions in this exam. Write your name and SS# on each sheet detached.

1. What are the meanings of the following terms? (10 pts.)

   a) INADDR_ANY:

   b) AF_INET:

2. What system call(s) should a TCP server or client use to find the following? (10 pts.)

   a) Local binding (IP address and port number):

   b) Remote binding (IP address and port number):

3. In Figure 4.13 of your textbook, Close(connfd) is called twice, once in the parent, and once in the child. Assume that the child runs first after the call to fork(). What effects will these two calls to Close(connfd) have, with respect to the connected socket, connfd? (10 pts.)

4. Why the TIME_WAIT state is always between 1-4 minutes? (8 pts.)

5. The following program fragment is copied, with some minor modification, from your textbook. Please explain briefly first what this fragment does, and then explain in detail the meaning of each numbered line. (15 pts.)

```
char *
sock_ntop(const struct sockaddr *sa, socklen_t salen)
{
   char    portstr[8];
   static char str[128];    /* Unix domain is largest */

10   switch (sa->sa_family) {
11   case AF_INET: {
12      struct sockaddr_in  *sin = (struct sockaddr_in *) sa;

13      if (inet_ntop(AF_INET, &sin->sin_addr, str, sizeof(str)) == NULL)
14         return(NULL);
15      if (ntohs(sin->sin_port) != 0) {
16         snprintf(portstr, sizeof(portstr), ":%d",  ntohs(sin->sin_port));

18         strcat(str, portstr);
      }
20    return(str);
   }
```

6. What value will a *big endian* client get in return if it sends the two short integer values, 0x3C4D and 0x1A2B, to a *little endian* server and have them added there? Show work. (15 pts.)

7. Compute the checksum for the following simplified TCP segment. Show work. (15 pts.)

1 1 1 0 0 0 1 1 1 0 0 0 1 1 0 0	0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1
1 0 1 1 0 1 1 0 1 1 0 1 1 0 1 1	0 0 1 1 0 0 1 1 0 0 1 1 0 0 1 1
0 1 1 1 0 1 1 1 0 1 1 1 0 1 1 0	

checksum

8. How does a concurrent TCP server listening on port 80 with multiple connections to the same client machine know to which TCP connection it should forward an incoming TCP client segment destined to port 80? (7 pts.)

9. Explain how you handled interrupted slow system calls, e.g., accept(), and how you avoided zombie processes in your homework assignment #2. (10 pts.)