1. Pseudo code the MPI *HitBall, PthreadDemo,* and *hello* programs.

HitBall-master:

FOR i=0 to 19:

set player to randomized value corresponding to other player nums

send randomized message to player

Send done message to all players

HitBall-slave:

WHILE master hasn't sent done message

receive message from master

if not done message, print random result with message.

PthreadDemo:

Create threads executing print\_message\_function

Wait for threads to finish (join)

print return message

hello:  
start all the threads

all threads print “Hello World from thread #”

master thread prints total number of threads

2. Explain the instruction: *MPI\_Comm\_rank(MPI\_COMM\_WORLD, &myRank);*

This gets a thread's “rank” in the group and assigns it to myRank.

3. In C, describe how the following operators are used: & and \*

& returns the address of the variable, while \* is the dereference operator, which means that it returns the variable to which a pointer points... So you can pass in the address of a variable to a function which accepts a pointer, and the function can use that pointer to modify the variable, allowing the value to be returned when a return statement is not possible.

4. In C, what is the major difference between the operators: dot (.) and arrow (→)

They both access a member of a structure in C, but the arrow works to access the member of a dereferenced structure, while the . Directly accesses the member of the structure.

5. In the command, why is -*lpthread* needed? Describe how the following command works: *echo aempi01v.sou.edu >> hosts*

-lpthread links the pthread library, which is needed to use pthreads.

*echo aempi01v.sou.edu >> hosts* prints the line aempi01v.sou.edu to the *hosts* file.

6. Describe how the following script command works and why it is needed: *export OMP\_NUM\_THREADS=4*

This command sets a system variable, OMP\_NUM\_THREADS, to 4. This specifies the maximum number of threads that can be spawned in parallel.

7. Describe how the following script command works and why *-r* is needed: *scp -r .ssh* [*harveyd@aempi02v.sou.edu*](mailto:harveyd@aempi02v.sou.edu)*:~*

This is a recursive secure copy of the .ssh folder to harveyd's home directory on host aempi02v.sou.edu. It needs to be recursive because .ssh is a directory.

8. What is the purpose of the *.mpd.conf* file? You might have to perform a web search to answer this question.

Secure communication between networked hosts working in parallel.

9. What does the following statement do? *MPI\_Init(&argc, &argv);*

This initializes the MPI execution environment, and must be called before any other MPI routines can be called.

10. What does *MPI\_COMM\_WORLD* mean?

This is a communicator which contains all the processes in a program. It has all the things.