ITCS 4/5145 Parallel Programming (Cluster Computing)
Test 1
3:30 pm - 4:50 pm, Tuesday September 25th, 2006

Name: ....

Part I is closed book. Do not refer to any materials for this part. Part II is open book. You may refer to any materials for this part (but not others in the class). Return Part I to get Part II.

Total /40
Part I /20
Part II /20

Part I

Do not refer to any materials for this part

Qu. 1   Answer each of the following <u>briefly</u>:
(a)   What is a grand challenge problem?   2

(b)   Derive Amdahl's law.   2

(c)   Under what circumstances can an asynchronous (blocking) send routine act as a synchronous send routine?
2

(d)   What does an MPI reduce operation do?   2

(e)   Most collective MPI operations (broadcast, gather, scatter, etc. ...) have a parameter called root. What does this parameter define?   2

(f)   Write the command to compile an MPI program called prog1.c to create an executable called prog1.   2

(g)   What does the MPI routine MPI_Wtime() do?

(h)   Draw the effect of two MPI "all-to-all" routines executed one after the other, each with the same arguments, using three processes and three data elements in each process.   4

(i)   Briefly what problem does the Barnes Hut algorithm address and how does it address the problem?   4

Name: ....

Total /40
Part I /20
Part II /20

Part II

You may refer to any materials for this part (but not others in the class).

Qu. 2   Write a complete MPI program that computes ? by a Monte Carlo method. Use a master process and eight slave processes. Each slave is to obtain its random numbers from the master process, when they require them.

For ITCS 5145 student only: Use a scatter routine to send the initial random numbers to the slaves. Subsequently, slaves will make requests for new random numbers.

Provide comments in your code to help the grader! If I do not understand the code, I will assume it is incorrect.

20