Teleclass - Introduction Parallel Programming
Test 1
Thursday October 8th, 1998, 8:00 am to 9:20 am

THREE question pages.
Attempt all questions in the spaces provided. **Name:** .....
Use additional paper if necessary.
You may refer to the attached Appendix A "Basic PVM routines", and Appendix B "Basic MPI routines". Do not refer to any other materials.

Mark/40

Qu. 1 Answer each of the following briefly:

(a) Name one reason for using parallel computers? 2

(b) What is the diameter of a two-dimensional mesh network having $n \times n$ nodes? 2

(c) Explain *wormhole routing*. 2

(d) Define system *efficiency* (as related to multiprocessor systems). 2

(e) What is a *process* (as related to parallel programming)? 2

(f) Explain what is meant by a blocking send routine (in the PVM/MPI sense). 2

(g) What is the purpose of the *message tag* attached to a message? 2

(h) Name one embarrassingly parallel computation/problem? 2

(i) Explain the pseudorandom number generator $x_{i+1} = (ax_i) \bmod m$ can be parallelized, in general terms. 2

(j) What is meant by the term *divide and conquer*? 2

(k) What is the time for a pipeline to compute n instances of a problem given that there are p stages in the pipeline? 2

(l) Briefly explain a Monte Carlo method for integrating a function numerically. Is this method an embarrassingly parallel method? Explain 4

Qu. 2 Write a PVM or MPI program to compute $\sin\theta$ according to:

$$\sin\theta = \theta - \frac{\theta}{3} + \frac{\theta}{5} - \frac{\theta}{7} + \frac{\theta}{9} -$$

using a pipeline method. A series of values are input, θ_0, θ_1, θ_2, θ_3, … . Provide clear comments.

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