

1. Give an Algorithm for performing parallel Matrix Multiplication, assuming the PRAM model, and a number of processors $0 < p < n$. Your algorithm should be as efficient as possible.
2. Suppose the following benchmark results have been obtained for three different machines. Time is in milliseconds. Which machine is faster? Why?

	Machine A	Machine B	Machine C
Benchmark 1	700	200	800
Benchmark 2	500	200	0
Benchmark 3	200	500	0
Benchmark4	200	600	600

3. Give the dependency graph for the following program. Indicate the types of dependencies.

A = B+C
C=D-E
E=A+B
C=A*E
A=B+E

4. Adding n numbers requires $\lg n$ time on a PRAM. Suppose you are trying to perform this operation as fast as possible on a machine without global memory. Each processor has its own local memory, which is directly, accessible to the other processors. Assuming the following three configurations what is the time-bound of the program on each. *Justify your answer.*
 - a. Hypercube
 - b. Ring
 - c. Cube-Connected Cycles
5. Given a program with 10,000 instructions, 5% of which are branch instructions, how many cycles will the program take on a computer with a 6-stage pipeline, assuming that a branch instruction causes a complete pipeline purge when it reaches the final stage of the pipeline.