CS 312 **Computer Organization and Architecture**

Assignment # 2 Due Date: February 25, 2003

Performance Evaluation

1. Consider two different implementations – M_1 and M_2 – of the same instruction set. There are four classes of instructions – A, B, C, and D, in the instruction set. The clock rates for M_1 and M_2 are 500 MHz and 750 MHz, respectively. The average number of cycles in each instruction class are:

Class	M_1 CPI	M_2 CPI
A	1	2
B	2	2
C	3	4
D	4	4

   (a) [5 pts] Assume that peak performance is defined as the fastest rate that a machine can execute an instruction sequence chosen to maximize that rate. What are the peak performances of M_1 and M_2 expressed as instructions per second?

   (b) [10 pts] If the number of instructions executed in a certain program is divided equally among the classes of instructions, how much faster is M_2 than M_1?

   (c) [5 pts] With equal distribution of instructions across classes, at what clock rate would M_1 have the same performance as 750 MHz M_2?

   (d) [10 pts] Let us change the distribution of instruction classes from equal to as follows:

Class	M_1	M_2
A	31%	40%
B	5%	7%
C	29%	21%
D	35%	32%

   Which machine is faster, and by how much?

The following problems are from your main text (Patterson and Hennessy)

1. [10 pts] Problem 2.15
2. [10 pts] Problem 2.16
3. [5 pts] Problems 2.17