Assignment # 1 **Advance Computer Architecture** **Dead line 1-03-2005**
Instructor: Saeed Zafar Before **11:00 AM**

Q1.
Suppose you wish to run a program P with $7.5x10^9$ instructions on a 5 GHz machine with CPI of 0.8.

- What is expected CPU time?
- When you run P, it takes 3sec of wall clock time to complete. What is the percentage of the CPU time P received?

Q2.
Consider two different implementations, P1 and P2, of the same instruction set. There are five classes of the instruction classes of instructions A, B, C, D, E in the instruction set.
P1 has a clock rate of 4GHz. P2 has a clock of 6 GHz. The average number of cycles for each instruction class for P1 and P2 is as follows:

Class	CPI on P1	CPI on P2
A	1	2
B	2	2
C	3	2
D	4	4
E	3	4

Assume that peak performance is defined as the fastest rate that a computer can execute any instruction sequence. What are the peak performances of the P1 and P2 expressed in instructions per second?

Q3.
For the following set of variables, identify all of the subsets that can be used to calculate execution time. Each subset should be minimal; that is, it should not contain any variable that is not needed.
{CPI, clock rate, cycle time, MIPS, number of instructions in program, number of cycles in program}

Q4.
The table below shows the number of floating-point operations executed in three different programs and the runtime for those programs on three different computers:

Program	Floating-point operations	Execution time in seconds		
		Computer A	Computer B	Computer C
Program1	$5x10^9$	2	5	10
Program2	$20x10^9$	20	20	20
Program3	$40x10^9$	200	50	15

- Which computer is fastest according to total execution time?
- How many times as it fast is it compared to other two computers?