Problem 6 ***(6 points)***
Consider two different implementations, P1 and P2, of the same instruction set. There are five classes of instructions (A, B, C, D and E) in the instruction set. P1 has a clock rate of 4 GHz, and P2 has a clock rate of 6 GHz. The average number of cycles for each instruction class for P1 and P2 are listed in the following table:

	Processor	CPI Class A	CPI Class B	CPI Class C	CPI Class D	CPI Class E
a	P1	1	2	3	4	5
	P2	3	3	3	5	5

	Processor	CPI Class A	CPI Class B	CPI Class C	CPI Class D	CPI Class E
b	P1	1	2	3	4	5
	P2	2	2	2	2	6

1.6.4 [5] <1.4> Assume that peak performance is defined as the fastest rate that a computer can execute any instruction sequence. What are the peak performances of P1 and P2 expressed in instructions per second

1.6.5 [5] <1.4> If the number of instructions executed in a certain program is divided equally among the five classes of instructions except for class A, which occurs twice as often as the others, how much faster is P2 than P1

1.6.6 [5] <1.4> At what frequency does P1 have the same performance as P2 for the instruction mix given in 1.6.5

Problem 7 ***(6 points)***
Suppose that we are developing a new version of the AMD Barcelona processor with a 4GHz clock rate. We have added some additional instructions to the instruction set in such a way that the number of instructions have been reduced by 15% from the values shown for each benchmark in exercise 1.12. The Execution times obtained are shown in the following table

	Name	Execution time (S)	Reference time (S)	SPECratio
a	bzip2	700	9650	13.7
b	go	620	10490	16.9

1.13.1 [10] <1.8> Find the new CPI

1.13.2 [10] <1.8> In general, these CPI values are larger than those obtained in previous exercises for the same benchmarks. This is due mainly to the clock rate used in both cases, 3GHz and 4GHz. Determine whether the increase in the CPI is similar to that of the clock rate. If they are dissimilar, why?

1.13.3 [5] <1.8> By how much has the CPU time been reduced

For your information, here is the date from exercise 1.12
The following table shows results for SPEC CPU2006 benchmark programs running on an AMD Barcelona.

	Name	Instruction count x 10^9	Execution time (S)	Reference time (S)
a	bzip2	2389	750	9650
b	go	1658	700	10490