

ELE 548 Mid Term Test, October 1997
Mark = 10, Time=50 Minutes

Q1-Consider two different machines M1 and M2 using same instruction set. There are four classes of instructions (A, B, C and D) for this instruction set.

M1 has clock rate of 50 MHz and the following CPI:

A =1, B=2, C=3 and D=4.

M2 has a clock rate of 75 MHz. and the following CPI:

A=2, B=2, C=4, D=4

- If the number of instructions executed in both machines are equally divided among classes, find which machine is faster.
- If M1 uses a hardware feature for class D that improve the performance of the above program by 20%, find the amount of improvement to class D.

Q2- Consider the following C code:

```
for (i=0; i < j; i++)  
    save[i]=k;
```

Assume that save is an array of words starts at address 1000. Registers \$15, \$16, \$17 are used for i, j and k and \$4=4, \$1=1.

- Write the above code using MIPS instructions.
- Calculate the time to execute the above code and average MIPS in a 100 MHz MIPS processor if the cost of arithmetic and logic instructions =1 cycle, data transfer instructions=4 cycles and control flow instructions =2 cycles.
- Find the performance improvement if a cache is used to reduce cost of data transfer from 4 cycles to 1cycle.