**Lab 3(c)**

**Problem 1**

Given that,

Number of instructions = 500 million instructions.

= 500 \* 106

= 5\*108

Frequency = 2.2GHZ.

Now the clock time = 1/ frequency

= 1/2.2 GHz

= 0.45 ns

= 0.45 \*10-9 seconds.

And, also mentioned that half of the instructions takes 3 clock cycles and rest of the instructions takes 10 clock cycles.

Now, the CPI (clocks per instructions) = (3) \* (50/100) + (10) \* (50/100)

= 3\* (0.5) + 10\*(0.5)

= 13(0.5)

= 6.5 CPI

Now the execution time of the program = (No. of instructions) \* (CPI) \* (Clock time)

= (5 \* 108) \* (6.5) \* (0.45 \* 10-9)

= 1.4625 seconds.

So, execution time = 1.4625 seconds.

**Problem 2**

MIPS is Million Instructions Per Second.

Thus, 20 MIPS means that the processor executes (20 \* 106) instructions per second.

Thus, number of instructions in the program

= (MIPS rate of the processor) \* (Execution time of program, in seconds)

= (20 \* 106) \* (30)

= 6 \* 108