Computer Org & Programming Lab 3 part C

Problem 1: Suppose a program contains 500 million instructions to execute on a processor running on 2.2 GHz. Half of the instructions take 3 clock cycles to execute, where rest of the instructions take 10 clock cycles. What is the execution time of the program?

Number of instructions = 500 million

$= 500 * 10^6$

$= 500 * 10^8$

Processor frequency = 2.2 GHz

Clock time = $\frac{1}{\text{frequency}}$

$= \frac{1}{2.2\,GHz} = 0.45\,ns \simeq 0.45 * 10^{-9}\,sec$

* half of the instructions take 3 clock cycles
* remaining instructions take 10 clock cycles

Clock per instructions = $3 * \left(\frac{50}{100}\right) + 10 * \left(\frac{5}{100}\right)$

$= 6.5$ clock per instructions

execution time of program: (# of instructions) * (CPI) * (clock time)

$= (5 * 10^8)(6.5)(0.45 * 10^{-9})$

$= 1.46$ sec

Therefore the execution time of the program: 1.46 seconds.

Problem 2: A processor is 20 MIPS. If you run a program on that processor and the program takes 30 seconds to finish. How many instructions are there in this program?

# of instructions in millions = MIPS * execution time

$x = 20 * 30\ sec$

$= 600$

$= 6 * 10^8$ instructions