1A) Using C1 on both M1 and M2, how much faster can the makers of M1 claim that M1 is compared with M2?

C1: CPI on M1 = (0.3\*4) + (0.5\*6) + (0.2\*8)

= 1.2 + 3 + 1.6

= 5.8

CPI on M2 = (0.3\*2) + (0.5\*4) + (0.2\*3)

= 0.6 + 2 + 0.6

= 3.2

M1 faster than M2: CPU TimeM2 = 3.2 / (2~~00\*10~~~~6~~) =1.6 = 1.10 times

CPU TimeM1 5.8 / (4~~00\*10~~~~6~~) 1.45

1B) Using C2 on both M1 and M2, how much faster can the makers of M2 claim that M2 is compared with M1?

C2: CPI on M1 = (0.3\*4) + (0.2\*6) + (0.5\*8)

= 1.2 + 1.2 + 4

= 6.4

CPI on M2 = (0.3\*2) + (0.2\*4) + (0.5\*3)

= 0.6 + 0.8 + 1.5

= 2.9

M2 faster than M1: CPU TimeM1 = 6.4 / (4~~00\*10~~~~6~~) =1.6 = 1.10 times

CPU TimeM2 2.9 / (2~~00\*10~~~~6~~) 1.45

2) Program 1 cycles = (1\*600) + (10\*600) + (10\*200) + (3\*50)

= 600 + 6000 + 2000 + 150

= 8750

Program 1 execution: 8750 cycles \* 1 second = 2.91 \* 10-6 s

3\*109 cycles

3A) Given that 40% of the first application is parallelizable, how much speedup would you achieve with that application if run in isolation?

**Speedup = 1 / ((1-f) + f/s)**

**= 1 / ((1-0.4) + 0.4/2)**

**= 1 / (0.4 + 0.2)**

**= 1.67**

3B) Given that 99% of the second application is parallelizable, how much speedup would you achieve with that application if run in isolation?

**Speedup = 1 / ((1-f) + f/s)**

**= 1 / ((1-0.99) + 0.99/2)**

**= 1 / (0.01 + 0.495)**

**= 1.98**

3C) How much overall speedup will you achieve if you parallelize both applications, given the information in parts a and b?

**System Speedup = 1 / ((1-f) + f/s)**

**= 1 / (0.8 + 0.2/2)**

**= 1 / (0.8 + 0.1)**

**= 1.11**