

**Question 5 (10 points):** When executing in a simulator simulating perfect caches, a program executes in 10 seconds in a processor with a clock frequency of 4 GHz. Every instruction executes in one cycle. (Hint: you can use this information to compute the number of instructions executed in the ideal machine). 25% of the instructions access memory. In an actual machine the hit rate of the L1 instruction cache is 98%, the hit rate of the L1 data cache is 90%, the access time of the L2 cache is 20 cycles. The local miss rate of the L2 cache is 25%. The access time for main memory is 140 cycles. How long it will take to execute the same program in the actual machine?