

Problem Solving

1. [Cache Memory]
 - a. A cache memory has 16 cache blocks (a block is 4bytes long) and it uses 2-way set associative placement policy. Identify the suitable block number for the memory address 0x10.
 - b. Calculate the average access time of a cache memory – main memory setup when the access time of the cache memory is 1ms, the access time of the main memory is 10ms and the hit rate is 50%.

2. [Pipelined Processors]
 - a. In the typical 5 stage pipeline we covered in the class assume that IF takes 3ns, ID takes 4ns, EXE taken 5ns, MEM takes 5ns and WB takes 3ns. Calculate the time taken to execute 100 instructions sequentially on this processor and then calculate the time taken to execute the instructions in pipeline. Finally, calculate the speedup of the pipelined processor.

3. [MIPS Assembly]
 - a. Write a MIPS Assembly program that takes a positive integer from the user and finds the sum of all the numbers from 1 up to the number entered by the user. Finally print the answer back to the console. For example, if the input by the user is 4, your program should print 10 (the answer is 10 because, $1 + 2 + 3 + 4 = 10$).