CS220: Lab#11B

- All problems must be solved using MIPS assembly language programs. The programs should be tested using SPIM.

- To start SPIM, type `qtspim` at the command line.

- Sections A.9 and A.10 from Appendix A of Patterson and Hennessy have all details regarding SPIM.

- Use of pseudo-instructions supported by SPIM is allowed.

- When you enter a value from keyboard, make sure to press "ENTER" after entering the value; otherwise the system call layer will not accept the input. As a result, when entering an array of values, please enter them one per line in the simulated console.

- All outputs will be displayed in the simulated console.

1. [7 marks] Write a recursive function to do binary search on a given sorted array for a given element. Write a `main` function that accepts a positive integer `n` and `n` integer elements of a sorted array and an integer `k` to search in the array as inputs (from keyboard) and searches for `k` in the array using the binary search function. At the end, if the element is found, the `main` function should print "Found element at index N" where N is the index of the found element in the array and if the element is not found, the `main` function should print "Element was not found". Allocate the array statically and assume $n \leq 12$.

2. [3 marks] Take an integer n and a single-precision floating-point n-dimensional vector $A = (a_{n-1}, a_{n-2}, \ldots, a_0)$ as inputs. Compute $\sum_{i=0}^{n-1} (-1)^i a_i$ using a MIPS assembly language program. The final single-precision floating-point result should be printed on the display.