

COS Assignment #4: Problems involving MIPS Assembly Language

Assigned: 10 February 2025; Due: 19 February 2025, in Class; Total Points = 50; Credit = 5%;

General Instructions:

1. Please download MARS or SPIM Simulator and make yourself familiar with it.
2. For each programming assignment described below, (i) write your underlying algorithm in high-level descriptive pseudo-code, (ii) write your MIPS-code with documentation, (iii) run the MIPS-code via simulator on input data, and (iv) submit a print-out of your documented code and results.

Problem 1: (10 points) Write a program that prompts a user to input a positive integer $N \leq 1000$, and calculate the sum $S = 1 + 2 + 3 + \dots + N$. Do not use the standard summation formula for arithmetic progression; compute the sum iteratively using a loop structure. At the end, print "The Sum (S) is equal to ...". Use appropriate "syscall" command to facilitate reading N as input, and to print the result.

Problem 2: (15 points) Write MIPS-code to collect two positive integers from the user (say 48, 20), and to calculate and display their GCD (Greatest Common Divisor) by repeated subtraction. Please do not use MIPS divide instruction. On reading inputs from the user, there should be sanity checking to ensure that the integers are positive. Use "syscall" commands for effecting input and output.

Problem 3: (10 points) Write MIPS-code to collect a positive integer $N \geq 2$ from the user, and to calculate and display the value of N-th Fibonacci Number. On reading the input from the user, there should be sanity checking to ensure that the integer is non-negative. Use "syscall" commands for effecting input and output.

Problem 4: (15 points) Write MIPS-code that reads an integer N from the user and prints out its 32-bit 2's complement representation in hexadecimal, to the terminal. Use "syscall" commands for effecting input and output. Be careful about the maximum or minimum value of N that is representable with 32-bits.