

CSCI 2500: Computer Organization

Lab 8 – Exercises

MAL FPU Programming

1. 'Round and Round': Download lab8_ex1.s from LMS; Labs → Lab 8 (4/1/2015)). The file lab8_ex1.s is a skeleton program that needs to be completed. The final complete MIPS program needs to prompt the user for an input radius and compute the surface area and the volume of a sphere (Note: the equations for surface area and volume are provided in the comments in the program file). You must use single precision numbers to compute the surface area and volume of the sphere. You may assume the user will enter a floating point number for the input radius.
2. 'Using Double Precision: Find the Average': Download lab8_ex2.s from LMS; Labs → Lab 8 (4/1/2015)). The file lab8_ex2.s is also a skeleton program needs to be finished. The final complete MIPS program should compute the average value of the array `intarr`. Your program must also print the average of the array and store the average in memory. You must use double precision numbers to compute the average of the integer array (Hint: you do not need to sum up the array using the FP coprocessor).
3. 'Floating Point Coprocessor Failure': Assume that your MIPS floating point coprocessor has failed in the middle of a calculation and the only instruction that works is `mfc1` (move from coprocessor 1). You know where the code stopped and that there is a mission critical single precision value stored in register `$f6` that you need to negate (i.e. flip the sign). Show a sequence of instructions that will negate this value using only the main MIPS CPU.