Universidad de Puerto Rico – Mayaguez
Department of Electrical and Computer Engineering

INEL 4206 – Microprocessors

Practice Problems

1. Write a recursive procedure[1] to compute and return the greatest common divisor (GCD) of 2 integer arguments. First write the procedure in a HLL and then compile the HLL code to MIPS assembly. The GCD can be defined recurrently as:
    a. GCD(a, b) = b if b divides a
    b. GCD(a, b) = GCD(b,r) otherwise, where r = a MOD b

2. Write a procedure called ***precision***() with no arguments. The procedure must return the smallest floating point number that can be added to 1 such that the result of the sum is different from 1.

3. Write a procedure ***roots(a,b,c)*** that receives the three float coefficients of a polynomial and returns an integer representing the number of distinct real roots.

4. Write a procedure sin(x) that takes one float argument representing an angle in radians. The procedure should return the approximated floating point value of sin(x) by computing the sum of a Taylor series.

5. Write procedures that take a one dimensional array of integers a and its length and perform the following operations:
    a. Multiply the array by a scalar
    b. Compute the sum of the elements of the array
    c. Sort the array increasingly

6. Repeat problem 3 this time using arrays of double precision floating point numbers.

7. Write a procedure mmult(a,b,c,n) that takes as arguments three square matrices a, b and c with common length n. The procedure should compute the matrix product of a and b a store the result on matrix c. First write a HLL version of mmult and then hand-compile it to MIPS assembly language.

8. All the problems on Chapters 3 and 4 of Patterson and Hennessy **Computer Organization and Design**.

[1] In all problems provide answers in both High Level Language and Assembly Language