Universidad de Puerto Rico
Recinto Universitario de Mayagüez
Departamento de Ingeniería Eléctrica y Computadoras

ICOM 4036 – Programming Languages

Otoño de 2007

Ejercicios de práctica
Examen Parcial III

Write recursive versions in C++ and MIPS assembly language of the following functions:

1. factorial(n) returns n!
2. gcd(a,b) returns the greatest common divisor of a and b
3. fibonacci(n) returns the nth element of the fibonacci sequence
4. Write functions in FORTRAN to compute the functions in 1-3 iteratively
5. Write a function in FORTRAN to approximate the value of sin(x) to within machine precision. Use a Taylor polynomial with enough terms to yield the required precision

Write Scheme functions that apply fold, map or fold-map to compute the following:

6. The maximum element of a list as determined by the < operator
7. The member? function for sets implemented as unordered lists
8. Determine if a lists has an element that is divisible by n
9. The concatenation of a set of lists
10. The union of a set of lists

Answer the following questions:

1. What high level language feature makes it necessary to use stacks to hold subroutine activation frames. Why?
2. What kind of low level support is necessary to implement the simplest type of subroutine discussed in class? Why?
3. Mention 5 characteristics of the FORTRAN programming language that were chosen to facilitate its implementation. Briefly explain how does each one facilitates implementation.
4. Mention 5 features of the FORTRAN programming language that survived in modern programming languages. Explain why you think they have survived.
5. Mention 2-3 characteristics of the FORTRAN programming language that help compilers generate very efficient code. Explain.