

University of Puerto Rico Mayagüez
Department of Electrical and Computer Engineering

ICOM 4036: Programming Languages – Spring 2006

Problem Set 3

DUE Tuesday April 4, 2006

Double Integrals

For this programming assignment you are required to develop three functions in the FORTRAN programming language using the GNU FORTRAN 77 compiler (a.k.a. g77) for either the Linux or the Windows OS.

Function 1 – Computing Machine Precision

Write a function that computes the machine precision using the algorithm discussed in class. The function takes no parameters and returns a double precision floating point number.

Function 2 – Computing the numerical double integral

Write a function that takes an integrable function $f(x,y)$ of two parameters and computes the numerical integral:

$$\int_a^{b \ g(x)} \int_{f(x)} f(x,y) dy dx$$

The function should return a double precision floating point number that is as precise as the machine allows. The function should also take lower and upper and lower limits of integration a and b for the x dimension as well as functions $f(x)$ and $g(x)$ returning the lower and upper limits of integration for the y dimension as a function of x .

Function 3 – Approximating π

Write a function that returns the approximation of π as a double precision floating point value by using as a basis the approximation of the volume of a unit sphere as a numerical integral of volume. The value should be as precise as the machine allows.

Test your program using the GNU f77 compiler. Submit one source file using the submit program by the deadline above.