

Exercise 4 FYSA120 C++ numerical programming Winter 2015

Email the *commented* solution code (*.cpp, *hpp) as attachments to : fysy160(at)gmail.com Subject line: demo4

1. GSL can be used to numerically integrate integrals of the type

$$\int_a^b f(x, par_1, par_2, \dots, par_N) dx ,$$

where f is nonsingular and par_i are the parameters in f . Write a C++ code (yes, C++) that uses the GSL function `int gsl_integration_qag()`, described in the manual `gsl-ref.pdf`. Test your program by computing the integral

$$\int_0^{\frac{\pi}{4}} \cos(\sin(\alpha x + \beta)) dx .$$

With $\alpha = 5.6$, and $\beta = 2.2$ you should get 0.632681768577.

A common mistake is to fail to pass the values of α and β to the integrand function. Let's not use global variables, tempting as it may be. Instead, use GSL to pass the parameters. Bunch the parameters together and sent to GSL an "envelope", a `struct` or a `class`. The sample code `paraexamples.cpp` shows how this is done.

You may also find the C example of GSL integration ([web link](#)) useful.