ATK IV Numerical Programming
Project work 0
A template project report

Write Your Name Here
Degree Programme -year
youremail@address.net

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1 Assignment

This section contains your description of the assignment. Here you need to present the relevent equations, the basic theory etc. Don't panic. It doesnt have to be long, nor very complicated. As long as it indicates that you've understood the assignment.

Make sure you answer here to the questions: "What needs to be done" and "what is required".

1.1 Equations

Here are a few example equations. See the LaTeX source file to see the details how they were written. This is an example of mathematical text inserted into the text body, or "inline" math. $a + b = c$. Or $1 + x = 3$ from which follows $x = 2$. Here we need more space for the formula:

$$a + b + c = 0$$

The text continues here! This equation will have a number.

$$x + yz = -1 \tag{1}$$

Next, a piece of mathematical text with sub- and superscripts, inserted into the text. The square of a number, a^2. A variable with an index, X_k. Here's a longer one:

$$a_1 + a_2 + a_3 + a_4 = 0$$

Derivative of $f(x)$ is $f'(x)$. In this equation, we have a long subscripts:

$$X_{2k+1} = A^{10} X_{2k} + b_{l-1} \tag{2}$$

Trigonometric functions.

$$\sin x, \qquad \cos x, \qquad \tan x$$

$$\cot x, \qquad \sec x, \qquad \csc x$$

Hyperbolic.

$$\sinh x, \qquad \cosh c, \qquad \tanh x$$

Inverses trigonometric functions.

$$\arcsin x, \qquad \arccos x, \qquad \arctan x$$

Logarithms and exponent.

$$\exp x, \qquad \log x, \qquad \ln x$$

It is wrong to write these without the backslash. Don't try this at home, but here's an example:

$$sinx, \qquad cosx, \qquad tanx$$

This is very ugly and difficult to read.

Now, a square root! A small one, $\sqrt{25} = 5$, or a bigger one by Pythagoras,

$$\sqrt{x^2 + y^2} = r \tag{3}$$

Now a fraction. These should always be written in display math mode.

$$\frac{p}{q} = x$$

Another one,

$$\frac{\sqrt{a+b}}{\sqrt{a-b}}$$

Integrals, products and sums. First, a simple integral

$$\int_0^x f(x')dx' = F(x)$$

Next, sum

$$S = \sum_{k=1}^{N} k$$

And a product

$$P = \prod_{k=-\infty}^{\infty} z_k$$

Here's the greek alphabet:

$$\alpha, \beta, \gamma, \delta, \epsilon, \zeta, \eta, \theta, \iota, \kappa, \lambda, \mu, \nu, \pi, \rho, \sigma, \tau, \chi, \xi, \phi, \psi, \upsilon, \omega$$

And in upper-case (many are the same as their Latin counterparts):

$$\Gamma, \Delta, \Theta, \Lambda, \Pi, \Sigma, \Xi, \Phi, \Psi, \Upsilon, \Omega$$

This equation will be referred to.

$$\sqrt{-1} = i \tag{4}$$

We can use Eq. (4) to define the imaginary unit i.

2 Implementation

Here you describe the structure of your program. How the problem was solved, what subroutines you used, what do they do etc.

3 Results

Plots, numerical results, program output etc. Always check you've presented everything needed.

4 Listings

You may leave the source code listings to the last section of your report. Please always use a proper package and command to include the listings to ensure legibility.

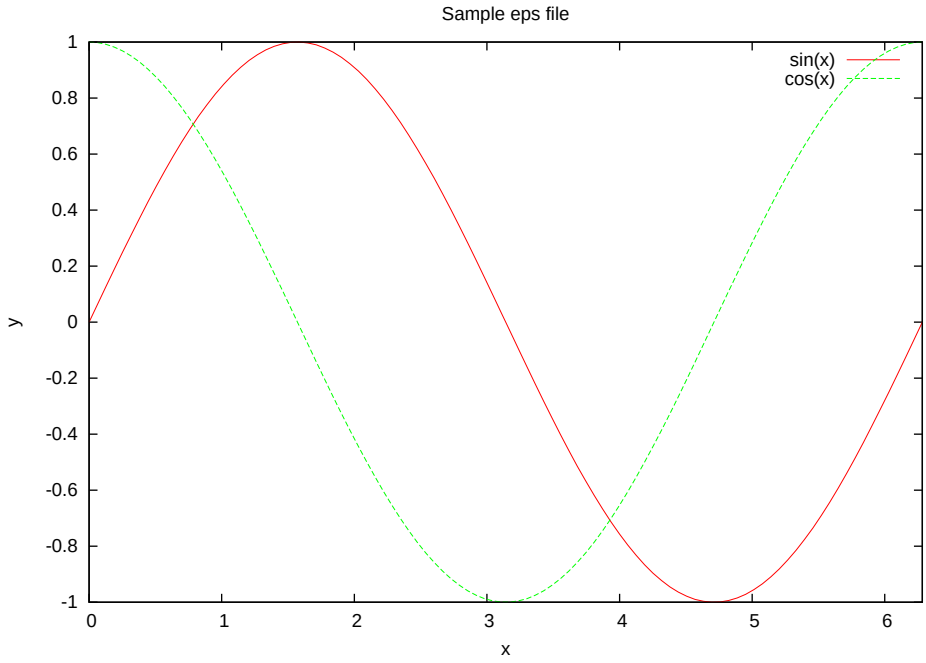

Figure 1: A sample figure

4.1 A FORTRAN listing

```
C       This program prints the values of the function
C       f(x) = cos(x) + sin(x)*exp(-x*x/2)
C       at n points on an interval given by the user.
        PROGRAM ex001
        IMPLICIT NONE
        INTEGER i, n
        REAL x, xi, xf, dx, y
        WRITE(*,*) "Numerical␣Programming␣Ex.␣1.3"
        WRITE(*,*) "Give␣start␣and␣end␣points␣",
       $     "and␣the␣number␣of␣points."
        READ(*,*) xi, xf, n
        dx = (xf-xi) / (n-1)
        DO 1000, i = 0, n-1
           x = xi + i*dx
           y = COS(x) + EXP(-.5*x**2)*SIN(x)
           WRITE(*,*) x, y
 1000   CONTINUE
        END
```