FEEG6002 Advanced Computational Methods 1:

Laboratory-Assignment 3

Contents

Prerequisites: C program skeleton, printf, for-loop, input and output

1 Training exercise: Tabulate sin(x)

Write a program that tabulates the sin function f(x)=sin(x) from x=XMIN=1. to x=XMAX=10. with N=10 points. Keep your code flexible so that parameters XMIN, XMAX and N can be changed by changing their value in only place of the code. You should use # defines for this (i.e. using symbolic constants for N, XMAX and XMIN).

Save the file as tabulatesin.c.

The output should be formatted using the "%f %f" place holders for x and f(x), respectively, i.e. use the formatting as %f provides it, and have one space between the numbers for x and f(x).

As usual, when you use floating point variables in C, you should use the double data type.

You can use the Python/Matlab code as guidance.

Python:

```
import math
N = 10              # use N points
XMIN, XMAX = 1, 10    # from x=xmin to x=xmax

for i in range(N):
   x = XMIN + (XMAX - XMIN) / (N - 1.) * i
   y = math.sin(x)
   print("%f %f" % (x, y))
```

Matlab:

```
N = 10;           % use N points
XMIN = 1;
XMAX = 10;         % from x=XMIN to x=XMAX
for i=0:N-1
   x = XMIN+(XMAX-XMIN)/(N-1.)*i;
   y = sin(x);
   fprintf('%f %f\n',x,y)
```

```
end
```

The first few lines of the output should look like this:

```
1.000000 0.841471
2.000000 0.909297
3.000000 0.141120
```

Submit your work

Email your file tabulatesin.c attached to an email with subject line training 3 to feeg6002@soton.ac.uk.

Files to attach:

- tabulatesin.c

2 Laboratory Exercise: Tabulate sin(x) and cos(x)

Save the program as tabulate2.c, and extend it so that it prints:

```
x  sin(x)  cos(x)
```

instead of only x sin(x) in the version above.

Use #define and the names N, XMAX and XMIN as in the tabulatesin.c example above to set the limits for the table, using the same starting values of N=10, XMIN=1.0, and XMAX=10.0. As before, use %f for the printing of the floating point numbers, and use one space between x and sin(x) and cos(x).

Submit your work

Email your file tabulate2.c attached to an email with subject line training 3 to feeg6002@soton.ac.uk.

Files to attach:

- tabulate2.c