# Comments on the Computational Mathematics/Information Technology Coursework 2010

The individual feedback for this coursework is available on CitySpace.

## Excel Spreadsheet

The feedback for this is in the form of a modified spreadsheet. The top sheet contains the results of various tests on the functions you were asked to write. Also shown are plots of your functions and the correct ones. The correct ones are plotted first, so if you can’t see both your curve and mine they agree reasonably closely. However, you still may lose marks if they are not close enough! Quite a few of you will notice the plots for the sixth order polynomial best fit diverging at the right. This is because of lack of accuracy in the coefficient of $x^{6}$. Since $x^{6}$ is quite large towards the end of the interval, this can introduce a noticeable error. It is always best to use several *significant figures* of accuracy, not just several decimal places.

 It is clear from some of the plots that many of you did not do basic tests on your functions to see that they gave sensible answers! Just evaluating them at a few points, or better still plotting a graph, will soon tell you if your function is not working, or producing nonsense numbers.

 Obviously, if you didn’t write a function, or wrote one that Excel was unable to run, you don’t get many marks. It was clear that many of you didn’t test functions, or couldn’t spot obvious errors. Where a function was defined, but crashed when I tried to use it I just commented out the code in the function. You would get a mark for defining a function, but nothing else. Check your functions in the Visual Basic editor to see if this applies to you.

Some typical errors which cause functions to fail were not putting “End If” at the end of a block of if statements, or putting “(x)” after the bit where you define a function’s return value. For example

Function F(x)

F = x^2

End Function

Works, but

Function F(x)

F(x) = x^2

End Function

doesn’t.

Some errors in function definitions came from programming faults. For example, some of you typed what looked like something sensible:

Function CSpline(x)

If 1 <= x <= 2 Then

CSpline = ……

Else If 2 <= x <=3 Then

……

Unfortunately this gets interpreted in a way that obviously wasn’t expected. First it checks to see if 1<=x. The answer will be either true of false. It now compares this to 2. It doesn’t make much sense to compare “true” or “false” to 2, but Excel converts them to 1 and 0 respectively. Both are less than 2, so the statement “1 <= x <= 2 “ is always true, and so CSpline is always evaluated using the definition for the first segment. The first line should have been “If 1 <= x And x <=2 then”. If Visual Basic were more fussy, it would have issued an error, pointing out that checking if true is less than 2 is meaningless.

Incidentally, in the above case it would have been better for CSpline to have the first line as

If 1 <= x And x < 2 Then

Then when you evaluate the function at 2 you will use the second bit of the spline definition. This should return the exact value at this point. The accuracy at the data points was one of the things tested in the marking scheme.

## Report on Cubic Splines

All the reports were checked for plagiarism. Generally this was not a problem, but it was for some. The basic rule is that you should type up everything in your own words, and never use copy-and-paste. Some coincidences with other people’s documents will happen, and so a non-zero plagiarism score is almost inevitable (a couple did get 0%, much to my surprise). But including unmodified chunks of material from other sources is not acceptable. Particularly if you got penalized for this, make sure you consult the on-line resources that the University has made available about plagiarism so that you do not get caught out again. Plagiarism can lead to charges of academic misconduct.

Included in the mark scheme here are marks for getting the file name right, and not writing a report that was too long. Those who wrote too little lost marks elsewhere. There was also a mark for using the equation editor. When ever you type mathematics in Word you should use the equation editor — even if you are just typing a variable name in the text. This ensures consistency.

Some of you included a graph of your spline showing how it passed through the points – a good idea that got you extra credit. However, some people included plots where the splines clearly didn’t go through the data points. This could lose you credit!