

Lagrange Interpolation

Due Time: 23.59, March 19 2017 **Earnings:** 9% of your final grade

NOTE: The code in this assignment must be your own work. It must not be code taken from another student or written for you by someone else, even if you give a reference to the person you got it from (attribution); if it is not entirely your own work it will be treated as plagiarism and given a fail mark, or less.

Purpose: You are to write the code in Visual Studio 2013 for a simple C (or C++) language console application that does Lagrange Interpolation (as given in course notes) of data input by the user (unlimited quantity) and using dynamic memory allocation to hold data as it is processed.

An example of the output of the running application is given at the end. Yours must work identically and produce identical (or very similar) output. When the application terminates it releases all dynamically allocated memory so it does not have a resource leak (or you lose 30%).

See the Marking Sheet for how you can lose marks, but you will lose at least 60% if:

1. it fails to build in Visual Studio 2013,
2. It crashes in normal operation,
3. it doesn't produce the example output.

What to Submit : Use Blackboard to submit this assignment as a zip file (**not** RAR) containing only the source code file(s) ass2.cpp (definitely not the entire project!). The name of the zipped folder **must** contain your name as a prefix so that I can identify it, for example using my name the file would be tyleraAss2CST8233.zip. It is also vital that you include the Cover Information (as specified in the Submission Standard) as a file header in your source file so the file can be identified as yours. Use comment lines in the file to include the header.

- Before you submit the code, check that it builds and executes in Visual Studio 2013 as you expect - if it doesn't build for me, for whatever reason, you get a deduction of at least 60%.
- Make sure you have submitted the correct file – if I cannot build it because the file is wrong or missing from the zip, even if it's an honest mistake, you get 0.
- The late penalty is 25% per day. Don't send me the zip as an email attachment – it will get 0.

Example Output:

```
Please select an option
Press i to do an interpolation
Press q to quit
i
Do a Lagrange Interpolation
How many control points are there?
5
Please enter the x coordinate for control point #0: 1
Please enter the y coordinate for control point #0: 0.1411
Please enter the x coordinate for control point #1: 1.3
Please enter the y coordinate for control point #1: -0.6878
Please enter the x coordinate for control point #2: 1.6
Please enter the y coordinate for control point #2: -0.9962
Please enter the x coordinate for control point #3: 1.9
Please enter the y coordinate for control point #3: -0.5507
Please enter the x coordinate for control point #4: 2.2
Please enter the y coordinate for control point #4: 0.3115

Please select an option
Press s to do a single interpolation
Press r to interpolate in increments over the entire range
Press q to quit
s
```

CST 8233 – W17 - Assignment #2

Interpolate Single

Please enter the value of x you wish to interpolate for:1.5
Interpolated pair is (1.500000,-0.977381)

Please select an option

Press s to do a single interpolation

Press r to interpolate in increments over the entire range

Press q to quit

r

The interpolation goes from x = 1.000000 to x = 2.200000

Please enter the number of values of x you wish to interpolate for:5

#	1	2	3	4	5
x:	1.0000	1.3000	1.6000	1.9000	2.2000
y:	0.1411	-0.6878	-0.9962	-0.5507	0.3115

Please select an option

Press s to do a single interpolation

Press r to interpolate in increments over the entire range

Press q to quit

r

The interpolation goes from x = 1.000000 to x = 2.200000

Please enter the number of values of x you wish to interpolate for:9

#	1	2	3	4	5	6	7	8	9
x:	1.0000	1.1500	1.3000	1.4500	1.6000	1.7500	1.9000	2.0500	2.2000
y:	0.1411	-0.3015	-0.6878	-0.9350	-0.9962	-0.8600	-0.5507	-0.1283	0.3115

Please select an option

Press s to do a single interpolation

Press r to interpolate in increments over the entire range

Press q to quit

r

The interpolation goes from x = 1.000000 to x = 2.200000

Please enter the number of values of x you wish to interpolate for:50

#	1	2	3	4	5	6	7	8	9
10	11	12	13	14	15	16	17	18	19
20	21	22	23	24	25	26	27	28	29
30	31	32	33	34	35	36	37	38	39
40	41	42	43	44	45	46	47	48	49
50									
x:	1.0000	1.0245	1.0490	1.0735	1.0980	1.1224	1.1469	1.1714	1.1959
1.2204	1.2449	1.2694	1.2939	1.3184	1.3429	1.3673	1.3918	1.4163	1.4408
1.4653	1.4898	1.5143	1.5388	1.5633	1.5878	1.6122	1.6367	1.6612	1.6857
1.7102	1.7347	1.7592	1.7837	1.8082	1.8327	1.8571	1.8816	1.9061	1.9306
1.9551	1.9796	2.0041	2.0286	2.0531	2.0776	2.1020	2.1265	2.1510	2.1755
2.2000									
y:	0.1411	0.0695	-0.0031	-0.0761	-0.1491	-0.2214	-0.2927	-0.3625	-0.4303
-0.4957	-0.5585	-0.6181	-0.6743	-0.7268	-0.7753	-0.8196	-0.8595	-0.8946	-0.9249
-0.9503	-0.9705	-0.9855	-0.9952	-0.9996	-0.9987	-0.9924	-0.9808	-0.9639	-0.9418
-0.9146	-0.8825	-0.8456	-0.8041	-0.7581	-0.7080	-0.6539	-0.5962	-0.5351	-0.4711
-0.4044	-0.3354	-0.2646	-0.1923	-0.1191	-0.0454	0.0282	0.1013	0.1733	0.2436
0.3115									

Please select an option

Press s to do a single interpolation

Press r to interpolate in increments over the entire range

Press q to quit