

Kelly Lwin
Numerical Methods (CS3010)
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Programming Project 4 Report

First input (input.txt from Canvas)

input.txt ×					
1	1	1.5	0	2	
2	3	3.25	3	1.67	

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Run ProgrammingProject4 ×
C:\Users\646ca\CLionProjects\ProgrammingProject4\cmake-build-debug\ProgrammingProject4.exe

      x      f[]      f[,]      f[,]      f[,,,]
      1      3      1/2      1/3      -1.9967
    3/2    13/4      1/6     -1.6633
      0      3     -0.6650
      2     1.6700

Interpolating polynomial (Newton form):
3 + 1/2(x - 1) + 1/3(x - 1)(x - 3/2) - 1.9967(x - 1)(x - 3/2)(x - 0)

Interpolating polynomial (Lagrange form):
[ (x - 3/2)(x - 0)(x - 2) / (1 - 3/2)(1 - 0)(1 - 2) ] * 3 + [ (x - 1)(x - 0)(x - 2) / (3/2 - 1)(3/2 - 0)(3/2 - 2) ] * 13
/ 4 + [ (x - 1)(x - 3/2)(x - 2) / (0 - 1)(0 - 3/2)(0 - 2) ] * 3 + [ (x - 1)(x - 3/2)(x - 0) / (2 - 1)(2 - 3/2)(2 - 0) ] *
1.6700

Simplified polynomial:
3x^3 - 7x^2 + 49/12x - 1.9967

Process finished with exit code 0
```

Second input

input2.txt						
1	-2	-1	0	1	2	
2	5	2	1	2	5	

```
Run ProgrammingProject4 x
C:\Users\646ca\CLionProjects\ProgrammingProject4\cmake-build-debug\ProgrammingProject4.exe

      x      f[]      f[,]      f[, ,]      f[, , ,]      f[, , , ,]
      -2      5      -3      1      0      0
      -1      2      -1      1      0
      0      1      1      1
      1      2      3
      2      5

Interpolating polynomial (Newton form):
5 - 3(x + 2) + 1(x + 2)(x + 1) + 0(x + 2)(x + 1)(x - 0) + 0(x + 2)(x + 1)(x - 0)(x - 1)

Interpolating polynomial (Lagrange form):
[ (x - -1)(x - 0)(x - 1)(x - 2) / (-2 - -1)(-2 - 0)(-2 - 1)(-2 - 2) ] * 5 + [ (x - -2)(x - 0)(x - 1)(x - 2) / (-1 - -2)(
-1 - 0)(-1 - 1)(-1 - 2) ] * 2 + [ (x - -2)(x - -1)(x - 1)(x - 2) / (0 - -2)(0 - -1)(0 - 1)(0 - 2) ] * 1 + [ (x - -2)(x -
-1)(x - 0)(x - 2) / (1 - -2)(1 - -1)(1 - 0)(1 - 2) ] * 2 + [ (x - -2)(x - -1)(x - 0)(x - 1) / (2 - -2)(2 - -1)(2 - 0)(2
- 1) ] * 5

Simplified polynomial:
5x^4 + 7x^3 - 4x^2 - 8x

Process finished with exit code 0
```

Third input

input3.txt						
1	5	20	35	60	78	
2	12	31	28	55	70	

```
Run ProgrammingProject4 x
C:\Users\646ca\CLionProjects\ProgrammingProject4\cmake-build-debug\ProgrammingProject4.exe

      x      f[,]      f[, ]      f[, ,]      f[, , ,]      f[, , , ,]
      5      12      19/15      -0.0489      0.0015      -0.0000
      20     31      -1/5       0.0320      -0.0007
      35     28      1.0800     -0.0057
      60     55       5/6
      78     70

Interpolating polynomial (Newton form):
12 + 19/15(x - 5) - 0.0489(x - 5)(x - 20) + 0.0015(x - 5)(x - 20)(x - 35) - 0.0000(x - 5)(x - 20)(x - 35)(x - 60)

Interpolating polynomial (Lagrange form):
[ (x - 20)(x - 35)(x - 60)(x - 78) / (5 - 20)(5 - 35)(5 - 60)(5 - 78) ] * 12 + [ (x - 5)(x - 35)(x - 60)(x - 78) / (20 - 5)(20 - 35)(20 - 60)(20 - 78) ] * 31 + [ (x - 5)(x - 20)(x - 60)(x - 78) / (35 - 5)(35 - 20)(35 - 60)(35 - 78) ] * 28 + [ (x - 5)(x - 20)(x - 35)(x - 78) / (60 - 5)(60 - 20)(60 - 35)(60 - 78) ] * 55 + [ (x - 5)(x - 20)(x - 35)(x - 60) / (78 - 5)(78 - 20)(78 - 35)(78 - 60) ] * 70

Simplified polynomial:
12x^4 - 21581/15x^3 + 54754.2844x^2 - 738928.6874x + 2466697.2451

Process finished with exit code 0
```