**Computational Mathematics Assignment 3**

**Student name: Davy Nolan**

**Student number: 17330208**

**Q 4.26 (Done in matlab)**

matA = [-2 1 0; 1 -2 1; 0 1 -1.5];

matB = [4 -1 0 1 0; -1 4 -1 0 1; 0 -1 4 -1 0; 1 0 -1 4 -1; 0 1 0 -1 4];

fprintf("\nInfinityNorm(matA) = %d",InfinityNorm(matA));

fprintf("\nInfinityNorm(matB) = %d",InfinityNorm(matB));

function N = InfinityNorm(A)

[m,n] = size(A);

rows = [];

for i=1 : n

row = 0;

for j=1 : m

row = row + abs(A(i,j));

end

rows = [rows, row];

end

N = max(rows(:));

end

**A close up of a logo

Description automatically generatedExecution**:

**Q 6.13**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Wind Speed (MPH)** | 14 | 22 | 30 | 38 | 46 |
| **Electric Power (W)** | 320 | 490 | 540 | 500 | 480 |

**Lagrange Polynomials**

First-order polynomial:

Second-order polynomial:

General formula:

Where:

Determine fourth-order polynomial in the Lagrange form that passes through the points..

use this polynomial to calculate the power at a wind speed of 26mph..

Fourth-order polynomial:

f(x) = ((x-x2)\*(x-x3)\*(x-x4)\*(x-x5))/((x1-x2)\*(x1-x3)\*(x1-x4)\*(x1-x5)) \* y1

+ ((x-x1)\*(x-x3)\*(x-x4)\*(x-x5))/((x2-x1)\*(x2-x3)\*(x2-x4)\*(x2-x5)) \* y2

+ ((x-x1)\*(x-x2)\*(x-x4)\*(x-x5))/((x3-x1)\*(x3-x2)\*(x3-x4)\*(x3-x5)) \* y3

+ ((x-x1)\*(x-x2)\*(x-x3)\*(x-x5))/((x4-x1)\*(x4-x2)\*(x4-x3)\*(x4-x5)) \* y4

+ ((x-x1)\*(x-x2)\*(x-x3)\*(x-x4))/((x5-x1)\*(x5-x2)\*(x5-x3)\*(x5-x4)) \* y5

f(26) = ((26-22)\*(26-30)\*(26-38)\*(26-46))/((14-22)\*(14-30)\*(14-38)\*(14-46)) \* 320

+ ((26-14)\*(26-30)\*(26-38)\*(26-46))/((22-14)\*(22-30)\*(22-38)\*(22-46)) \* 490

+ ((26-14)\*(26-22)\*(26-38)\*(26-46))/((30-14)\*(30-22)\*(30-38)\*(30-46)) \* 540

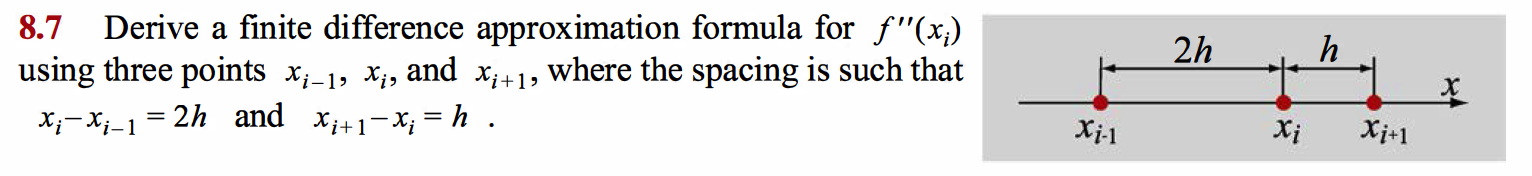
+ ((26-14)\*(26-22)\*(26-30)\*(26-46))/((38-14)\*(38-22)\*(38-30)\*(38-46)) \* 500

+ ((26-14)\*(26-22)\*(26-30)\*(26-38))/((46-14)\*(46-22)\*(46-30)\*(46-38)) \* 480

f(26) = (-12.5) + (229.6875) + (379.6875) + (-78.125) + (11.25)

f(26) = 530W

**Q 8.7**



Taylor Series:

Taylor Series for expansion point :

We can sub in h for :

Taylor Series for expansion point :

We can sub in 2h for :

Adding both equations:

Solve for :

Include truncation error:

**Q 8.9**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Year** | 1980 | 1990 | 2000 | 2002 | 2003 | 2006 | 2008 |
| **#Males** | 413395 | 511227 | 618182 | 638182 | 646493 | 665647 | 677807 |
| **#Females** | 54284 | 104194 | 195537 | 215005 | 225042 | 256257 | 276417 |

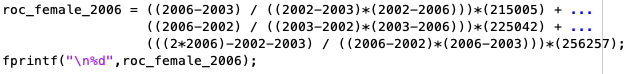
(a)

A screenshot of a cell phone

Description automatically generated



A picture containing table

Description automatically generated

(b)

**Male:**

4939.916666 = ((2006-2008) / ((2003-2006)\*(2003-2008)))\*(646,493) +

(((2\*2006)-2003-2008) / ((2006-2003)\*(2006-2008)))\*(665,647) + ((2006-2003) / ((2008-2003)\*(2008-2006)))\*(X)

4939.916666 = (-86199.0666667) + (-110941.166667) + (0.3X)

X = ((4949.916666) + (86199.0666667) + (110941.166667)) / 0.3

X = 673600.499979

Error: |1 - (677,807 / 673600.499979)| = 0.006244

= 0.6244%

**Female:**

10,681 = ((2006-2008) / ((2003-2006)\*(2003-2008)))\*(225,042) + (((2\*2006)-2003-2008) / ((2006-2003)\*(2006-2008)))\*(256,257) + ((2006-2003) / ((2008-2003)\*(2008-2006)))\*(X)

10,681 = (-30005.6) + (-42709.5) + (0.3X)

X = ((10,681) + (30005.6) + (42709.5)) / 0.3

X = 277,987

Error: |1 - (276,419 / 277,987)| = 0.00564

= 0.564%