# MTH603 Assignment 2 Solution Spring 2021

**Question No 1 Solution**

Let x=1.5 appear at the beginning of the table so we use the forward difference formula to find its derivative.

Here h=0.5 (Difference of x values)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **x** | *f* (*x*) | *f* (*x*) | 2 *f* (*x*) | 3 *f* (*x*) | 4 *f* (*x*) | 5 *f* (*x*) |
| 1.5 | 3.375 |  |  |  |  |  |
| 2.0 | 7.000 | 3.625 |  |  |  |  |
| 2.5 | 13.625 | 6.625 | 3.000 |  |  |  |
| 3.0 | 24.000 | 10.375 | 3.750 | 0.750 |  |  |
| 3.5 | 38.875 | 14.875 | 4.500 | 0.750 | 0 |  |
| 4.0 | 59.000 | 20.125 | 5.250 | 0.750 | 0 | 0 |

**First Derivative**

1 

2 *f* (*x*) 3 *f* (*x*) 4 *f* (*x*) 

*Df* (*x*)  *h* *f* (*x*) 



 

2 3 4

 

*f* ' (1.5)  1 3.625  3  0.750  0 

5  2 3 4 

*f* ' (1.5)  23.625 1.5  0.25  0

*f* ' (1.5)  4.75

**2nd Derivative**

Using the formula D2f(x)

*D*2 *f* (*x*) 

1 2 *f* (*x*)  3 *f* (*x*)  11 4 *f* (*x*)  5 5 *f* (*x*)



*f* '' (1.5) 

*h*2 

1

12 6 

3.000  0.750  11 (0)  5 (0)



(0.5)2  12 6 

*f* '' (1.5)  43.000  0.750  0  0

*f* '' (1.5)  9

# Question No 2 Solution

The Farward defferences are tabulated as:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| x | *f* (*x*) | *y* | 2 *y* | 3 *y* |
| 1 | 3.49 |  |  |  |
| 1.4 | 4.82 | 1.33 |  |  |
| 1.8 | 5.96 | 1.14 | - 0.19 |  |
| 2.2 | 6.5 | 0.54 | - 0.6 | - 0.41 |

Here h = 0.4

Farward defferences Interpolation formula:

*yx*  *y*

0  *p**y*0

 *p*( *p* 1) 2 *y*

2! 0

 *p*( *p* 1)( *p*  2) 3 *y*

3! 0

 ........  *p*( *p* 1)( *p*  *n* 1) *n y*

*n*! 0

 *error*

Let *y*1.6 be the value of y when x=1.6 then

p = *x*  *x*0

*h*

*f* (1.6)  *y*1.6

 3.49  (1.5)(1.33)  1.5(1.5 1) (0.19)  1.5(1.5 1)(1.5  2) (0.41)

2! 3!

*f* (1.6)  3.49 1.995  0.0712  0.0256

*f* (1.6)  5.4394

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**THE END**