* 1. A robot arm with a rapid laser scanner is doing a quick quality check on holes drilled in a rectangular plate. The centers of the holes in the plate describe the path the arm needs to take, and the hole centers are located on a Cartesian coordinate system (with the origin at the bottom left corner of the plate) given by the specifications in following Table.

|  |  |
| --- | --- |
| **X (in.)** | **Y(in.)** |
| **2.00** | **7.2** |
| **4.25** | **7.1** |
| **5.25** | **6.0** |
| **7.81** | **5.0** |
| **9.20** | **3.5** |
| **10.60** | **5.0** |

What is the value of **y** at **x=4.0** using **Newton’s divided difference method** of interpolation and a **third order** polynomial? Find the **absolute relative approximate error** for the third order polynomial approximation.

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1. Find the equations of quadratic Splines using data from the following table and represent them in matrix form. 2. Table 1  |  |  | | --- | --- | | x | f(x) | | 0 | 0 | | 1 | 5.8 | | 1.5 | 10.2 | | 2 | 15.4 | | 2.8 | 22.9 | |
|  |

X0 = 2.0

X1=4.25

X2=5.25

X3=7.81

X= 4

b0 = 7.2

b1 = -0.044444

b2 = -0.32479

b3 = 0.090198



y(4) = 7.2 + (-0.044444)(4.0-2.0) + (-0.32479)(4.0-2.0)(4.0-4.25) + (0.090198)(4.0-2.0)(4.0-4.25)(4.0-5.25)

**y(4)= 7.3298 in.**

Absolute relative approximate error, € = | (7.3298-7.2735)/7.3298| = **0.76%**