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Ngày . . No.

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Q1)

a) Using Newton interpolating polynomials

$$f(x) = f(x_1) + \frac{f(x_2) - f(x_1)}{x_2 - x_1}(x - x_1)$$

$t = 2.5$

between 2.2 and 2.7

First order:

$$f(x) = f(2.2) + \frac{f(2.7) - f(2.2)}{2.7 - 2.2}(x - 2.2)$$

$$f(x) = 10.256 + \frac{36.576 - 10.256}{2.7 - 2.2}(x - 2.2)$$

$$f(x) = 10.256 + 52.64(x - 2.2)$$

$$f(2.5) = 26.048$$

Second order:

$$f(x) = f(x_1) + \frac{f(x_2) - f(x_1)}{x_2 - x_1}(x - x_1) + \frac{f(x_3 x_2) - f(x_2 x_1)}{x_3 - x_1}(x - x_1)(x - x_2)$$

$$f(x) = f(2.1) + \frac{f(2.2) - f(2.1)}{2.2 - 2.1}(x - 2.1) + \frac{f(x_3 x_2) - f(x_2 x_1)}{x_3 - x_1}(x - x_1)(x - x_2)$$

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~~$f(x) = 7.752 + 25.04(x-2.1) +$~~

$f(x_3 x_2) = \frac{f(x_3) - f(x_2)}{x_3 - x_2} = 52.64$

$f(x) = 7.752 + 25.04(x-2.1) + \frac{52.64 - 25.04}{2.7 - 2.1}$

$(x-2.1)(x-2.2)$

$f(x) = 7.752 + 25.04(x-2.1) + 46(x-2.1)(x-2.2)$

$f(2.5) = 23.288$

b) Using third order lagrange

$$f(x) = \frac{(x-x_2)(x-x_3)(x-x_4)}{(x_1-x_2)(x_1-x_3)(x_1-x_4)} f(x_1) + \frac{(x-x_1)(x-x_3)(x-x_4)}{(x_2-x_1)(x_2-x_3)(x_2-x_4)} f(x_2)$$
$$+ \frac{(x-x_1)(x-x_2)(x-x_4)}{(x_3-x_1)(x_3-x_2)(x_3-x_4)} f(x_3) + \frac{(x-x_1)(x-x_2)(x-x_3)}{(x_4-x_1)(x_4-x_2)(x_4-x_3)} f(x_4)$$

$f(x) = 0 - 143.556(x-2.2)(x-2.7)(x-3)$
$+ 256.4(x-2.1)(x-2.7)(x-3) + (-406.4)$
$(x-2.1)(x-2.2)(x-3) + 305.556(x-2.1)(x-2.2)(x-2.7)$

At $t = 2$

$\Rightarrow f(2.5) =$

Q2)

a) Using

$f(x) = f(x_1)$

$x = 3.5$ b

First order

$f(x) = f(3$

$f(3.$

$f(2)$

$f(3$

Second

$f(x) = f($

$\frac{f(x_3 x_2) -}{x_3 -}$

At $t = 2.5$

$\Rightarrow f(2.5) = 22.09$

Q2)

a) Using Newton interpolating polynomials

$$f(x) = f(x_1) + \frac{f(x_2) - f(x_1)}{x_2 - x_1}(x - x_1)$$

$x = 3.5$ between 3 and 4.5

First order:

$$f(x) = f(3) + \frac{f(4.5) - f(3)}{4.5 - 3}(x - 3)$$

$$f(3.5) = f(3) + \frac{f(4.5) - f(3)}{4.5 - 3}(3.5 - 3)$$

$$f(3.5) = 3.125$$

Second order:

$$f(x) = f(x_1) + \frac{f(x_2) - f(x_1)}{x_2 - x_1}(x - x_1) + \frac{f(x_3 x_2) - f(x_2 x_1)}{x_3 - x_1}(x - x_1)(x - x_2)$$

$$f(x) = f(2.5) + \frac{f(3) - f(2.5)}{3 - 2.5}(x - 2.5) + \frac{-0.75 + 3.75}{4.5 - 2.5}(x - 2.5)(x - 3)$$

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$f(3.5) = 2.375$

b) Using third order lagrange

$$f(x) = \frac{(x-x_2)(x-x_3)(x-x_4)}{(x_1-x_2)(x_1-x_3)(x_1-x_4)} f(x_1) + \frac{(x-x_1)(x-x_3)(x-x_4)}{(x_2-x_1)(x_2-x_3)(x_2-x_4)} f(x_2) + \frac{(x-x_1)(x-x_2)(x-x_4)}{(x_3-x_1)(x_3-x_2)(x_3-x_4)} f(x_3) + \frac{(x-x_1)(x-x_2)(x-x_3)}{(x_4-x_1)(x_4-x_2)(x_4-x_3)} f(x_4)$$

~~$f(3.5) =$~~ Use $x_1 = 2.5$

$x_2 = 3$

$x_3 = 4.5$

$x_4 = 5$

$f(3.5) = 2.375$