Quizz 07
Cálculo Numérico / Análise Numérica

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$$\text{Dado } X = \begin{bmatrix} -0.20000 \\ 0.50000 \\ 0.90000 \\ 1.30000 \\ 1.60000 \\ 2.10000 \end{bmatrix} \text{ e } Y = \begin{bmatrix} -0.72800 \\ -0.87500 \\ 0.44900 \\ 3.22700 \\ 6.61600 \\ 14.98100 \end{bmatrix}.$$

1) Começando a contar a partir do índice 0, determine $P_2(x)$ e $P_6(x)$.
2) Qual é o coeficiente que multiplica $P_2(x)$, no polinômio de Lagrange?
3) Quanto vale $P_2(1,55)$?
4) Quanto vale $L_5(1,6)$?

1)

$P_k(x) = \prod_{i=0, i\neq k}^{n}(x - x_i)$

$P_2(x) = (x - (-0.2)) \times (x - 0.5) \times (x - 1.3) \times (x - 1.6) \times (x - 2.1)$

$P_5(x) = (x - (-0.2)) \times (x - 0.5) \times (x - 0.9) \times (x - 1.3) \times (x - 1.6)$

2)

$c_2 = \frac{y_2}{P_2(x_2)}$

$P_2(x) = (x - (-0.2)) \times (x - 0.5) \times (x - 1.3) \times (x - 1.6) \times (x - 2.1)$

$P_2(x_2) = (0.9-(-0.2)) \times (0.9-0.5) \times (0.9-1.3) \times (0.9-1.6) \times (0.9-2.1) = -0.14784$

$c_2 = \frac{0.499}{-0.14784} = -3.375271$

3)

$P_2(x) = (x - (-0.2)) \times (x - 0.5) \times (x - 1.3) \times (x - 1.6) \times (x - 2.1)$

$P_2(x) = (1.55 - (-0.2)) \times (1.55 - 0.5) \times (1.55 - 1.3) \times (1.55 - 1.6) \times (1.55 - 2.1)$

$P_2(1,55) = 0.012633$

4)

$L_5(x) = c_0 \times P_0(x) + c_1 \times P_1(x) + c_2 \times P_2(x) + c_3 \times P_3(x) + c_4 \times P_4(x) + c_5 \times P_5(x)$

$P_0(1.6) = P_1(1.6) = P_2(1.6) = P_3(1.6) = P_5(1.6) = 0$

$L_5(1.6) = c_4 \times P_4(1,6)$
$P_4(x) = (x - (-0.2)) \times (x - 0.5) \times (x - 0.9) \times (x - 1.3) \times (x - 2.1)$
$P_4(1.6) = -0.2079$
$P_4(x4) = -0.2079$
$c_4 = \frac{6.616}{-0.2079} = -31.822992$
$L_5(1.6) = c4 \times P4(1.6) = 6.616$ (Note que como $(1.6,\ 6.616)$ é um ponto dado, temos necessariamente que $L_5(1.6) = 6.616$)