

7ª Lista de Exercícios**Ygor Tavela Alves 10687642****3.1.5)****a)**

$$\begin{bmatrix} \phi_1(1.0) & \phi_2(1.0) \\ \phi_1(1.5) & \phi_2(1.5) \\ \phi_1(2.0) & \phi_2(2.0) \\ \phi_1(2.5) & \phi_2(2.5) \\ \phi_1(3.0) & \phi_2(3.0) \end{bmatrix} \cdot \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} = \begin{bmatrix} 1.1 \\ 1.2 \\ 1.3 \\ 1.3 \\ 1.4 \end{bmatrix} \Rightarrow \begin{bmatrix} 1 & 1 \\ 1 & 1.5 \\ 1 & 2 \\ 1 & 2.5 \\ 1 & 3 \end{bmatrix} \cdot \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} = \begin{bmatrix} 1.1 \\ 1.2 \\ 1.3 \\ 1.3 \\ 1.4 \end{bmatrix}$$

b)

$$\begin{bmatrix} x_1 \\ x_2 \end{bmatrix} = \begin{bmatrix} 0.98000 \\ 0.14000 \end{bmatrix}$$

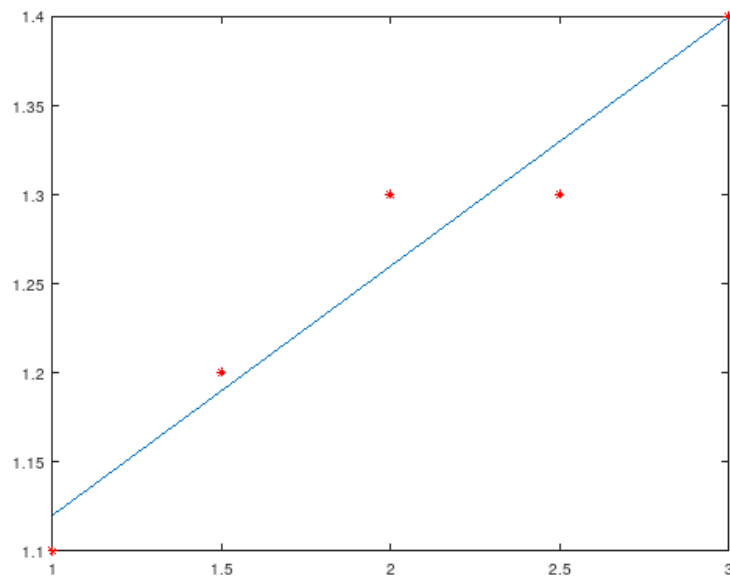
c)

Figure 1: Gráfico do polinômio de grau 1 interpolado para os pontos dados

d) $\|r\|_2 = 0.054772$

3.1.6)

a)

$$\begin{bmatrix} \phi_1(1.0) & \phi_2(1.0) & \phi_3(1.0) \\ \phi_1(1.5) & \phi_2(1.5) & \phi_3(1.5) \\ \phi_1(2.0) & \phi_2(2.0) & \phi_3(2.0) \\ \phi_1(2.5) & \phi_2(2.5) & \phi_3(2.5) \\ \phi_1(3.0) & \phi_2(3.0) & \phi_3(3.0) \end{bmatrix} \cdot \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} = \begin{bmatrix} 1.1 \\ 1.2 \\ 1.3 \\ 1.3 \\ 1.4 \end{bmatrix} \Rightarrow \begin{bmatrix} 1 & 1 & 1 \\ 1 & 1.5 & 2.25 \\ 1 & 2 & 4 \\ 1 & 2.5 & 6.25 \\ 1 & 3 & 9 \end{bmatrix} \cdot \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} = \begin{bmatrix} 1.1 \\ 1.2 \\ 1.3 \\ 1.3 \\ 1.4 \end{bmatrix}$$

b)

$$\begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} = \begin{bmatrix} 0.880000 \\ 0.254286 \\ -0.028571 \end{bmatrix}$$

c)

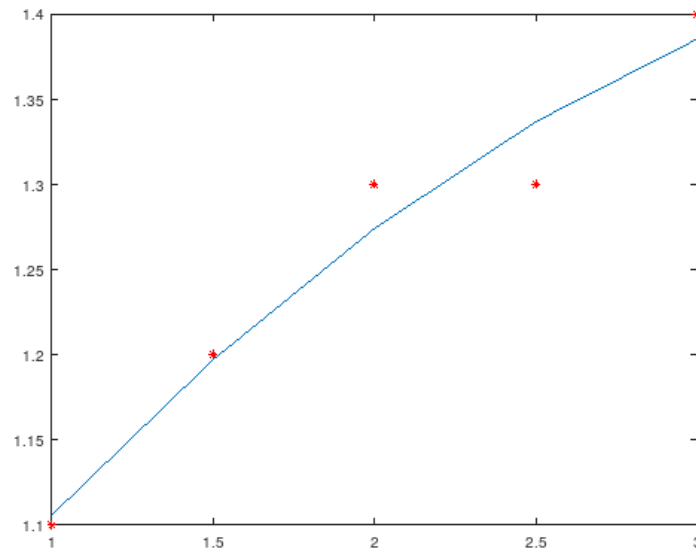


Figure 2: Gráfico do polinômio de grau 2 interpolado para os pontos dados

d) $\|r\|_2 = 0.047809$

3.1.7)

a)

$$\begin{bmatrix} \phi_1(1.0) & \phi_2(1.0) & \phi_3(1.0) & \phi_4(1.0) & \phi_5(1.0) \\ \phi_1(1.5) & \phi_2(1.5) & \phi_3(1.5) & \phi_4(1.5) & \phi_5(1.5) \\ \phi_1(2.0) & \phi_2(2.0) & \phi_3(2.0) & \phi_4(2.0) & \phi_5(2.0) \\ \phi_1(2.5) & \phi_2(2.5) & \phi_3(2.5) & \phi_4(2.5) & \phi_5(2.5) \\ \phi_1(3.0) & \phi_2(3.0) & \phi_3(3.0) & \phi_4(3.0) & \phi_5(3.0) \end{bmatrix} \cdot \begin{bmatrix} x_1 \\ x_2 \\ x_3 \\ x_4 \\ x_5 \end{bmatrix} = \begin{bmatrix} 1.1 \\ 1.2 \\ 1.3 \\ 1.3 \\ 1.4 \end{bmatrix}$$

$$\begin{bmatrix} 1 & 1 & 1 & 1 & 1 \\ 1 & 1.5 & 2.25 & 3.375 & 5.0625 \\ 1 & 2 & 4 & 8 & 16 \\ 1 & 2.5 & 6.25 & 15.625 & 39.0625 \\ 1 & 3 & 9 & 27 & 81 \end{bmatrix} \cdot \begin{bmatrix} x_1 \\ x_2 \\ x_3 \\ x_4 \\ x_5 \end{bmatrix} = \begin{bmatrix} 1.1 \\ 1.2 \\ 1.3 \\ 1.3 \\ 1.4 \end{bmatrix}$$

b)

$$\begin{bmatrix} x_1 \\ x_2 \\ x_3 \\ x_4 \\ x_5 \end{bmatrix} = \begin{bmatrix} 2.80000 \\ -4.51667 \\ 4.15000 \\ -1.53333 \\ 0.20000 \end{bmatrix}$$

c)

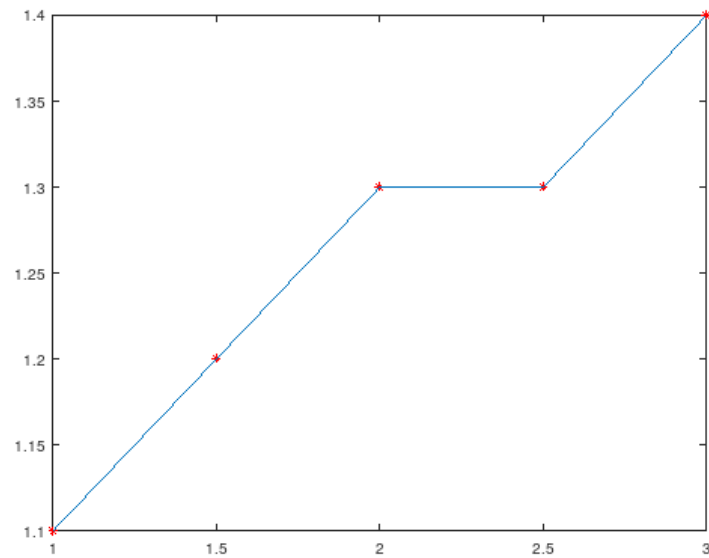


Figure 3: Gráfico do polinômio de grau 4 interpolado para os pontos dados

d) $\|r\|_2 = 5,0536 \cdot 10^{-15}$

e)

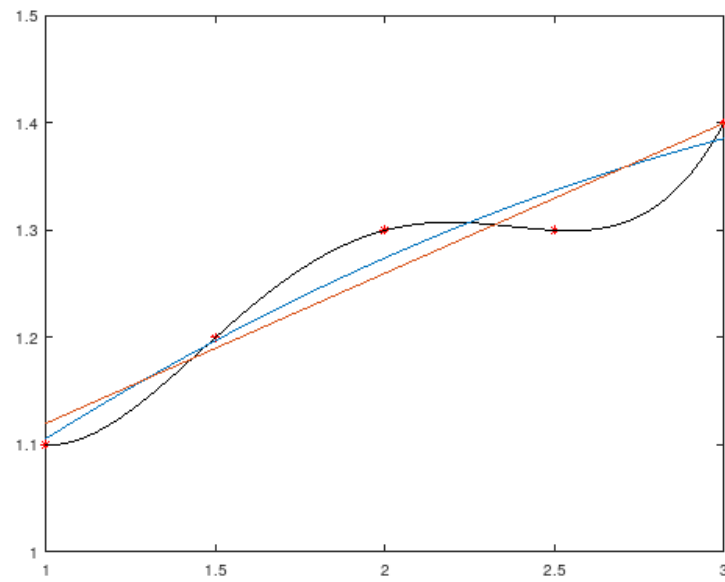


Figure 4: Gráfico dos polinômios interpolados de grau 1 (reta vermelha), 2 (curva azul) e 4 (curva preta) para os pontos representados no gráfico