

$$h = 0,2$$

$$x_4 = \overset{x_3}{1,6} + \overset{h}{0,2} = 1,8$$

$$x_5 = 1,8 + 0,2 = \boxed{2,0}$$

\therefore Precisamos encontrar o y_5 pois o problema pede p/ aproximar $y(2)$.

1º PASSO: Calcular y_4 usando método explícito.

$$y_4^{(0)} = y_3 + \frac{h}{24} (55f_3 - 59f_2 + 37f_1 - 9f_0)$$

$$y_4^{(0)} = 1,4116 + \frac{0,2}{24} (55 \cdot 1,0534 - 59 \cdot 0,95 + 37 \cdot 0,9830 - 9 \cdot 1,3394)$$

$$y_4^{(0)} = 1,63$$

$$x_4 = 1,8 \Rightarrow f(4) = \frac{1}{1,63^2} + 1,8 \ln 1,63 = \boxed{1,2558}$$

2º PASSO:

Corrigir y_4 usando método implícito.

$$y_4^{(1)} \overset{\text{iteração}}{=} y_3 + \frac{h}{24} \left[9f_4^{(0)} \overset{\text{iteração anterior}}{+} 19f_3 - 5f_2 + f_1 \right]$$

$$y_4^{(1)} = 1,4116 + \frac{0,2}{24} \left[9 \cdot 1,2558 + 19 \cdot 1,0534 - 5 \cdot 0,95 + 0,9830 \right]$$

$$y_4^{(1)} = \boxed{1,6412}$$

$$\text{Erro} = \left| \frac{1,6412 - 1,63}{1,6412} \right| = 0,0068$$

$0,0068 > 0,005 \Rightarrow \underline{\text{continua}}$

$$f_4^{(1)} = \frac{1}{1,6412^2} + 1,8 \cdot \ln 1,6412$$

$$f_4^{(1)} = \boxed{1,2630}$$

2ª iteração:

$$y_4^{(2)} = y_3 + \frac{h}{24} [9f_4^{(1)} + 19f_3 - 5f_2 + f_1]$$

$$y_4^{(2)} = 1,4116 + \frac{0,2}{24} [9 \cdot 1,2630 + 19 \cdot 1,0534 - 5 \cdot 0,95 + 0,9830]$$

$$y_4^{(2)} = \boxed{1,6417}$$

$$Error = \left| \frac{1,6417 - 1,6412}{1,6417} \right| = 0,0003 < \epsilon$$

$$\therefore x_4 = 1,8$$
$$y_4 = 1,6417$$

$$\Rightarrow f_4 = \frac{1}{1,6417} + 1,8 \ln 1,6417 = \boxed{1,2634}$$

→ Predictor

$$y_5^{(0)} = y_4 + \frac{h}{24} [55f_4 - 59f_3 + 37f_2 - 9f_1]$$

$$y_5^{(0)} = 1,6417 + \frac{0,2}{24} [55 \cdot 1,2634 - 59 \cdot 1,0534 + 37 \cdot 0,95 - 9 \cdot 0,983]$$

$$y_5^{(0)} = 1,9220$$

$$x_5 = 2$$

$$\Rightarrow f_5^{(0)} = \frac{1}{1,9220^2} + 2 \cdot \ln 1,9220 = \boxed{1,5775}$$

→ Corrector

$$y_5^{(1)} = y_4 + \frac{h}{24} [9f_5^{(0)} + 19f_4 - 5f_3 + f_2]$$

$$y_5^{(1)} = 1,6417 + \frac{0,2}{24} [9 \cdot 1,5775 + 19 \cdot 1,2634 - 5 \cdot 1,0534 + 0,95]$$

$$y_5^{(1)} = \boxed{1,9241}$$

$$Error = \left| \frac{1,9241 - 1,9220}{1,9241} \right| = 0,001 < 0,005$$

$$\therefore y_5 = 1,9241$$
$$x_5 = 2,0$$

OK!