Taylor

$$\begin{cases} y' = -y + x + 2 \\ y(0) = 2 \Rightarrow y_0 = 2 \end{cases}$$

$0 \le x \le 0{,}3 \quad \Rightarrow \quad h = 0{,}1$

$$y' = f = -y + x + 2$$
$$f' = -1y' + 1 = -1(-y + x + 2) + 1 = y - x - 1$$
$$f'' = y' - 1 = (-y + x + 2) - 1 = -y + x + 1$$

$$f_0 = f(x_0, y_0) = -y_0 + x_0 + 2 \Rightarrow f(0{,}2) = -2 + 0 + 2 = 0$$
$$f_0^{'} = f'(x_0, y_0) = y_0 - x_0 - 1 \Rightarrow f_0^{'}(0{,}2) = 2 - 0 - 1 = 1$$
$$f_0^{''} = f''(x_0, y_0) = -y_0 + x_0 + 1 \Rightarrow f_0^{''}(0{,}2) = -2 + 0 + 1 = -1$$

$x_1 = 0{,}1$

$$y_1 = y_0 + h\, f_0 + \frac{h^2}{2!} f_0^{'} + \frac{h^3}{3!} f_0^{''} = 2 + (0{,}1)\,(0) + \frac{(0{,}1)^2}{2!}(1) + \frac{(0{,}1)^3}{3!}(-1) = 2{,}00483$$

$$f_1 = f(x_1, y_1) = -y_1 + x_1 + 2 \Rightarrow f(0{,}1;\, 2{,}00483) = -2{,}00483 + 0{,}1 + 2 = 0{,}09517$$
$$f_1^{'} = f'(x_1, y_1) = y_1 - x_1 - 1 \Rightarrow f_1^{'}(0{,}1;\, 2{,}00483) = 2{,}00483 - 0{,}1 - 1 = 0{,}90483$$
$$f_1^{''} = f''(x_1, y_1) = -y_1 + x_1 + 1 \Rightarrow f_1^{''}(0{,}1;\, 2{,}00483) = -2{,}00483 + 0{,}1 + 1 = -0{,}90483$$

$x_2 = 0{,}2$

$$y_2 = y_1 + h\, f_1 + \frac{h^2}{2!} f_1^{'} + \frac{h^3}{3!} f_1^{''} = 2{,}00483 + (0{,}1)\,(0{,}09517) + \frac{(0{,}1)^2}{2!}(0{,}90483) + \frac{(0{,}1)^3}{3!}(-0{,}90483) = 2{,}01872$$

$$f_2 = f(x_2, y_2) = -y_1 + x_1 + 2 \Rightarrow f(0{,}2;\, 2{,}01872) = -2{,}01872 + 0{,}2 + 2 = 0{,}18128$$
$$f_2^{'} = f'(x_2, y_2) = y_1 - x_1 - 1 \Rightarrow f_1^{'}(0{,}2;\, 2{,}01872) = 2{,}01872 - 0{,}2 - 1 = 0{,}81872$$
$$f_2^{''} = f''(x_2, y_2) = -y_1 + x_1 + 1 \Rightarrow f_1^{''}(0{,}2;\, 2{,}01872) = -2{,}01872 + 0{,}2 + 1 = -0{,}81872$$

$x_3 = 0{,}3$

$$y_3 = y_2 + h\, f_2 + \frac{h^2}{2!} f_2^{'} + \frac{h^3}{3!} f_2^{''} = 2{,}01872 + (0{,}1)\,(0{,}18128) + \frac{(0{,}1)^2}{2!}(0{,}81872) + \frac{(0{,}1)^3}{3!}(-0{,}81872) = 2{,}04081$$