Newton's Method

$$x_0 = \text{initial guess}$$

$$x_{i+1} = x_i - \frac{f(x_i)}{f'(x_i)} \quad \textbf{for} \quad i = 0, 1, 2, \ldots.$$

$$f(x) = ((x-2)x+1)x - 3$$

$$f'(x) = (3x-4)x + 1$$

$$y = f(x) = x^4$$

$$y = f(x) = x^2 - 5 = 0$$

Find the multiplicity of the root $r = 0$ of $f(x) = \sin x + x^2 \cos x - x^2 - x$,

(use $x_0 = 1$).