

1) Compute Taylor's theorem of order 3 for the following function, at $x=0$

$$f(x) = \frac{1}{1+x+x^3}, \quad g(x) = \log(e^x - x)$$

$$h(x) = \sin x (e^x - \cos^2 x)$$

[It may be convenient to use the known development for e^x , $\cos x$ and $\log(1+x)$.]

2) Compute, using Taylor's polynomials.

$$\lim_{x \rightarrow 0} \frac{e^x - \sin x - \cos x}{e^{x^2} - e^{x^3}}$$

$$\lim_{x \rightarrow 0} \frac{\cos x - 1 + \frac{x}{2} \sin x}{[\log(1+x)]^4}$$

3) Do a complete study of the functions

$$f(x) = (x-1)^3(2-x) \quad \text{and}$$

$$f(x) = e^{\frac{x-2}{x}}$$