

Quiz #1

1- $\lim_{h \rightarrow 0} \frac{1-e^h}{h} = -1 \Rightarrow \frac{1-e^h}{h} = \frac{1-(1+h+h^2/2+\dots)}{h} = -1 - \frac{h}{2} + \dots$

$$= -1 + O(h)$$

2- $f(x) = f(x_0) + f'(x_0)(x-x_0) + \frac{f''(x_0)}{2}(x-x_0)^2 + \frac{f'''(f(x_0))}{3!}(x)$

$$\begin{aligned} f(x) &= e^{-2x} \\ f'(x) &= -2e^{-2x} & x_0 &= 0 \\ f''(x) &= 4e^{-2x} & x &= 0.1 \\ &= \frac{f^{(n+1)}(x_0)}{(n+1)!}(x-x_0)^{n+1} \end{aligned}$$

$$= 0.8187$$

3- $p = 12.56$
 $p^* = 12.55$
 10^{-8}

$$\frac{|p-p^*|}{|p|} = \frac{12.56 - 12.55}{12.56} = \frac{0.01}{12.56} = 7.96178 \cdot 10^{-4}$$

$$= 7.96178 \cdot 10^{-4} = 0.000796178 \cdot 10^{-8} \ll 10^{-8}$$

Since the required accuracy is able to equal with the relative error it is sufficient to have an accuracy of 10^{-8}