Question # 1: Consider the function $f(x) = x\,e^x$. In the following, the interpolating polynomial, $p_3(x)$, is computed by using Taylor expansion. To do so, do the following tasks:

1. [2 Marks] Using Taylor expansion of $x\,e^x$, write $f(x)$ as an infinite series.
2. [2 Marks] Find the values of a_0, a_1, $\cdots$, a_3 if the function is interpolated by degree three polynomial $p_3(x)$.
3. [2 Marks] Compute: $f(0.1)$ and $p_3(0.1)$ up to seven significant figures.
4. [2 Marks] Find the percent error for interpolating $f(x)$ by $p_3(x)$.