STEP II, 2005, Q1

1 Find the three values of x for which the derivative of $x^2e^{-x^2}$ is zero.

Given that a and b are distinct positive numbers, find a polynomial $\mathrm{P}(x)$ such that the derivative of $\mathrm{P}(x)e^{-x^2}$ is zero for $x = 0$, $x = \pm a$ and $x = \pm b$, but for no other values of x.