1) Consider an electron of mass $m$ in a three-dimensional box of size $a$ with energy $3x^2\hbar^2/ma^2$. A weak electric field in the $z$-direction and of strength $k$ is applied to the system. The perturbation is $ekz$. Compute the first-order correction to the electron’s energy.

2) How does the energy $E=3\hbar\omega$ of the two-dimensional harmonic oscillator separate due to the perturbation.

$$H' = K'xy$$