Tarefa 15: Landau gauge.

Hamiltonian (2D electron in a magnetic field): $\left[\frac{1}{2m^*}(\boldsymbol{p} + e\boldsymbol{A})^2\right]\Psi(\boldsymbol{r}) = E\Psi(\boldsymbol{r})$

Choice: **Landau gauge**. $\boldsymbol{A} = Bx\hat{\boldsymbol{y}}$

1) Show that this gauge choice also gives $\mathbf{B} = B\hat{\boldsymbol{z}}$

2) Show that the energy levels of the resulting Hamiltonian are also Landau levels.

   2.1) Write the Hamiltonian *H* and show that it commutes with one of the momenta.

   2.2) Show that *H* can be written as a Harmonic oscillator.