A spin-1/2 particle has a magnetic moment and is placed in a uniform magnetic field , which is aligned with the z-axis, so = B ˆ = B ẑ. It is known that the Hamiltonian operator for this sytem commutes with the spin component operator in the z direction (z basis?) but not with spin component operators in the x and y directions. The following argument should prove that hypothesis.

The Hamiltonian $\hat{H} = $ _̂ _