

Physics 472 - 2020

# Quantum Mechanics

## Quiz 7

Work for 10 minutes, please take a picture, and e-mail it to me at [dykmanm@msu.edu](mailto:dykmanm@msu.edu)

Consider an electron, spin  $s = 1/2$ , in a magnetic field with  $x$ - and  $y$ - components,  $\mathbf{B} = (B_x, B_y, 0)$ . Find the electron energies and find the eigenfunctions in terms of the eigenstates  $\chi_{\pm}$  of the operator  $s_z$ .

The Pauli matrices are

$$\sigma_x = \begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}, \quad \sigma_y = \begin{pmatrix} 0 & -i \\ i & 0 \end{pmatrix}, \quad \sigma_z = \begin{pmatrix} 1 & 0 \\ 0 & -1 \end{pmatrix}$$