NAME:	PHYSICS: S MR AAR I
	QUALITY: E S P I

Degenerate TIPT Quiz #1

Physics 564, Dr. Toggerson

30 April 2026

Objective

You should be able to find "good states" for the application of time-independent perturbation theory to first order in the situation of degenerate states.

Instructions

- You are allowed Griffiths & Schroeter's *Quantum Mechanics*.

  Note: The **Fundamental Equations** in the front cover and the **Mathematical Formulas** in the back cover may be useful!

- The Clebsch-Gordon Table is on page 179 of Griffiths

Problem

Consider a spinless charged particle in a 3-D harmonic oscillator:

$$H_0 = \frac{\vec{p}^2}{2m} + \frac{1}{2}m\omega^2\vec{r}^2$$

in a weak magnetic field which induces a perturbation

$$H' = \mu B_0 L_z.$$

Find the first-order energy corrections due to this magnetic field for the first four states.

Write your solution on the back (You got this!)