2. With no loss of generality choose $\vec{B}_0$ in the z direction and $\vec{B}_1$ in the x direction. Then $H_0 = -\vec{\mu}\cdot\vec{B}_0 = -\mu B_0 \sigma_z$ and $V = -\vec{\mu}\cdot\vec{B}_1 = -\mu B_1 \sigma_x$. Then choose $|i\rangle = \begin{pmatrix}1\\0\end{pmatrix}$, $|f\rangle = \begin{pmatrix}0\\1\end{pmatrix}$.

$$A_{flip} = \frac{1}{i\hbar}\int_0^T dt\, e^{i(\omega_{fi}-\omega)t} \langle f|-\mu B_1 \sigma_x|i\rangle.$$ The ground state energy $E_i = -\mu B_0$, the excited state energy is $E_f = \mu B_0$, and $\omega_{fi} = (E_f - E_i)/\hbar = 2\mu_0 B_0/\hbar$.

$$A_{flip} = \frac{1}{i\hbar}\frac{1}{i(\omega_{fi}-\omega)}\left[e^{i(\omega_{fi}-\omega)T} - 1\right](-\mu B_1)\begin{pmatrix}0 & 1\end{pmatrix}\begin{pmatrix}0 & 1\\ 1 & 0\end{pmatrix}\begin{pmatrix}1\\0\end{pmatrix}$$

$$= -\frac{1}{\hbar(\omega_{fi}-\omega)} e^{i(\omega_{fi}-\omega)T/2}\, 2i \sin(\omega_{fi}-\omega)\frac{T}{2}\,(-\mu B_1)$$

$$P_{flip} = |A_{flip}|^2 = \frac{4\mu^2 B_1^2}{\hbar^2}\frac{\sin^2(\omega_{fi}-\omega)\frac{T}{2}}{(\omega_{fi}-\omega)^2}$$