

An electron moves in a uniform electric field $E\hat{y}$ and a uniform magnetic field $B\hat{z}$. Show that the motion is a cycloid:

$$\begin{aligned}x &= a \sin(\omega t) + bt + x_0 \\y &= a (1 - \cos(\omega t)) + y_0 \\z &= z_0\end{aligned}\tag{1}$$