PHY3063 Spring 2018

HOMEWORK E

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Due: March 29, 2018

1. CH32 E-17.

2. CH32 E-32.

3. CH32 E-35.

4. CH32 P-2.

5. CH32 P-6 and 7.

How much differential change in m (dm) causes a change in x (dx)?

$$dm = \sqrt{\frac{mB^2q}{2\Delta V}}dx.$$

6. CH32 P-12.

Set the x-axis along the line connecting a and b. The coordinates for a and b are (0,0,0) and (0,0,L). $\vec{F}_B = i\int d\vec{\ell} \times \vec{B}$ where the differential element $d\vec{\ell} = \hat{\imath}dx + \hat{\jmath}dy$.

7. A uniform electric field $\vec{E} = E_o\hat{k}$ is applied at right angles to the uniform magnetic field $\vec{B} = B_o\hat{\imath}$ ($E_o, B_o > 0$). A particle of mass m and charge $+q$ is released at the origin.
(A) Explain why the motion of the particle is in the y-z plain.
(B) Show that the equation of motion of this particle will produce two coupled equations:

$$qB_o\frac{dz}{dt} = m\frac{d^2y}{dt^2},$$
$$qE_o - qB_o\frac{dy}{dt} = m\frac{d^2z}{dt^2}.$$

(C) Without an electric field, when a positive charge of $+e$ and mass m is with a speed of v. It will make a circular motion as we discussed in class. Set up the equations fo motion for this case and solve to show that it is a constant speed circular motion. Try as far as you can.

8. CH32 P-17.

9. CH32 P-18.

10. CH32 P-19.

Review how you reach Eq. 32-34. The torque from the magnetic force should balance that from gravity. The pivot point is the contact point where cylinder touches the plain. $\tau_G = mgr\sin\theta$