2.6a) $B_y = g(z)$

$$\frac{d}{dt}\gamma m c \beta_x = -e\vec{E} - e\vec{V}\times\vec{B} = -e\frac{dz}{dt}\, g(z)$$

$L = \frac{\phi\rho}{V_z}$ ← arc distance

$$\frac{d}{dt}\gamma m c\beta_x = -e\frac{d}{dt}\int_{-L/2}^{L/2} g(z)\,dz$$

$dz = c\cdot dt$

$$\cancel{\frac{d}{dt}}\gamma m c\beta_x = -e\cancel{\frac{d}{dt}}\int_{0}^{L/V_z} g(z)V_z\,dt$$

$dt = dz/V_z$

$$\gamma m c\beta_x = -e\, g(z)\cancel{V_z}\left(\frac{L}{\cancel{V_z}}\right)$$

$L = V_z\cdot t$

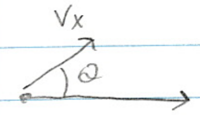
$t = L/V_z$

$$V_x = \frac{-e\, g(z)\, L}{\gamma m}$$

$$\frac{dx}{dt} = \frac{-g(z)\, e\, L}{\gamma m}$$

$$\int_{x_1}^{x_2} dx = \int_0^{L/V_z} \frac{-g(z)\, e\, L}{\gamma m}\, dt$$

$$\Delta x = \frac{-g(z)\, e\, L}{\gamma m}\left(\frac{L}{V_z}\right) = \frac{-g(z)\, e\, L^2}{\gamma m V_z} \approx \frac{-g(z)\, e\, L^2}{\gamma m c}$$



$$\theta = \operatorname{Arctan}\left(\frac{V_x}{V_z}\right)$$

$$\theta = \operatorname{Arctan}\left(\frac{-e\, g(z)\, L}{\gamma m V_z}\right) = \left(\Delta X \cdot L\right)$$