An electric field points into the page and occupies a circular region of radius 1.5 m. There are no electric charges in the region, but there is a magnetic field whose field lines form closed circles pointing clockwise. The magnetic field strength 50 cm from the center of the region is 7 T. (a) What is the rate of change of the electric field? (leave your answer in terms of \( \mu_0 \) and \( \varepsilon_0 \) treated as numbers with no units) (b) Is the electric field increasing or decreasing?

\[
B = \frac{\mu_0 \, i_d}{2\pi R}
\]

\[
i_d = \varepsilon_0 \, \frac{d\Phi_E}{dt} = \varepsilon_0 A \, \frac{dE}{dz} = \varepsilon_0 \, \pi R^2 \, \frac{dE}{dz}
\]

\[
\Rightarrow \quad B = \frac{\mu_0}{2\pi R} \, \varepsilon_0 \, \pi R^2 \, \frac{dE}{dz}
\]

\[
\frac{dE}{dt} = \frac{2B}{\varepsilon_0 \, \mu_0 \, R} = \frac{2}{\varepsilon_0 \, \mu_0} \left( \frac{1}{2} \right) = \frac{28}{\varepsilon_0 \, \mu_0} \frac{N}{c \cdot s}
\]

\[
= \frac{28}{\varepsilon_0 \, \mu_0} \frac{V}{m \cdot s}
\]

b) \( B \) clockwise \( \Rightarrow \) current parallel to \( E \)

\( \Rightarrow \) increasing