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### Displacement current

1. Consider a capacitor made of two parallel plates of area  $A$ .
  - a. When a charge  $Q$  is on the plates, what is the magnitude of the electric field within the capacitor (between the plates)?
  - b. What is the electric flux  $\Phi_E$  through a surface between the plates of the capacitor?
  - c. A current  $I = dQ/dt$  carries charge onto the capacitor plates. What is the formula for the rate of change of electric flux  $d\Phi_E/dt$  in terms of  $I$ ?
  - d. Invert the formula from part c to express current  $I$  in terms of  $d\Phi_E/dt$ .
  - e. What is the expression for the magnetic field  $B$  a distance  $r$  from the axis of a straight wire carrying current  $I$ ?
2. Write the expression for Ampère's law when the enclosed current is a "displacement" current.