1. What do the following Maxwell's equations actually represent?

   (a) $\nabla X \boldsymbol{E} = -\frac{\partial \boldsymbol{B}}{\partial t}$

   (b) $\nabla X \boldsymbol{B} = \mu_0 \boldsymbol{j} + \mu_0 \varepsilon_0 \frac{\partial \boldsymbol{E}}{\partial t}$

Ans: (a) The equation $\nabla X \boldsymbol{E} = -\frac{\partial \boldsymbol{B}}{\partial t}$ represents Faraday's law of induction where a changing magnetic field is responsible for the creation of an electric field. The minus sign is Lenz' law which indicates that the created field always opposes the change.

(b) The second equation has two parts. The first term on the right is a statement of Ampere's law where currents give rise to magnetic fields. The second term is a modification which was introduced by Maxwell himself where he conjectured that a changing electric field must give rise to a magnetic field.

2. What was Maxwell's important contribution?

   He was the first to show that electric and magnetic fields are merely two aspects of the underlying electromagnetic field. He thus united the separate field of electricity and magnetism into one field which is still considered true.

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