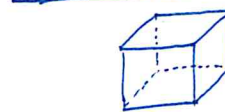
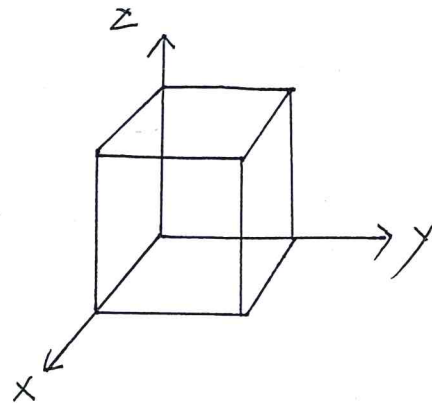


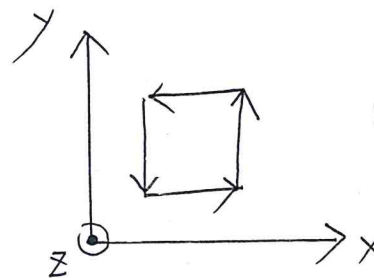
$$\vec{\nabla} \cdot \vec{E} = \lim_{\Delta x \rightarrow 0} \frac{\oint_{\partial \Delta V} \vec{E} \cdot d\vec{a}}{\Delta V}$$




$$= \lim_{\substack{\Delta x \rightarrow 0 \\ \Delta y \rightarrow 0 \\ \Delta z \rightarrow 0}} \frac{E_x(\text{前}) \Delta y \Delta z - E_x(\text{後}) \Delta y \Delta z + E_y(\text{右}) \Delta x \Delta z - E_y(\text{左}) \Delta x \Delta z + E_z(\text{上}) \Delta x \Delta y - E_z(\text{下}) \Delta x \Delta y}{\Delta x \Delta y \Delta z}$$

$$= \lim_{\Delta x \rightarrow 0} \frac{E_x(\text{前}) - E_x(\text{後})}{\Delta x} + \lim_{\Delta y \rightarrow 0} \frac{E_y(\text{右}) - E_y(\text{左})}{\Delta y} + \lim_{\Delta z \rightarrow 0} \frac{E_z(\text{上}) - E_z(\text{下})}{\Delta z} = \frac{\partial E_x}{\partial x} + \frac{\partial E_y}{\partial y} + \frac{\partial E_z}{\partial z}$$

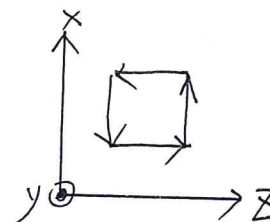
$$(\vec{\nabla} \times \vec{E})_z = \lim_{\square \rightarrow 0} \frac{\oint \vec{E} \cdot d\vec{\ell}}{\square}$$



$$= \lim_{\substack{\Delta x \rightarrow 0 \\ \Delta y \rightarrow 0}} \frac{E_x(\text{top})\Delta x + E_y(\text{right})\Delta y - E_x(\text{left})\Delta x - E_y(\text{bottom})\Delta y}{\Delta x \Delta y}$$

$$= \lim_{\Delta x \rightarrow 0} \frac{E_y(\text{right}) - E_y(\text{left})}{\Delta x} - \lim_{\Delta y \rightarrow 0} \frac{E_x(\text{top}) - E_x(\text{bottom})}{\Delta y} = \frac{\partial E_y}{\partial x} - \frac{\partial E_x}{\partial y}$$

$$(\vec{\nabla} \times \vec{E})_y = \lim_{\substack{\Delta x \rightarrow 0 \\ \Delta z \rightarrow 0}} \frac{E_z(\text{top})\Delta z + E_x(\text{right})\Delta x - E_z(\text{bottom})\Delta z - E_x(\text{left})\Delta x}{\Delta x \Delta z} = \frac{\partial E_x}{\partial z} - \frac{\partial E_z}{\partial x}$$



$$(\vec{\nabla} \times \vec{E})_x = \lim_{\substack{\Delta y \rightarrow 0 \\ \Delta z \rightarrow 0}} \frac{E_y(\text{top})\Delta y + E_z(\text{right})\Delta z - E_y(\text{bottom})\Delta y - E_z(\text{left})\Delta z}{\Delta y \Delta z} = \frac{\partial E_z}{\partial y} - \frac{\partial E_y}{\partial z}$$

