$$\vec{A}(\vec{r}) = \frac{\vec{\omega} \times \vec{r}}{r^2}, \quad \vec{\omega} = \text{const.}$$

$\frac{\partial r_j}{\partial r_i} = \delta_{ij}$

$$\left[\vec{\nabla} \times \vec{A}(\vec{r})\right]_i = \left[\vec{\nabla} \times \left(\frac{\vec{\omega} \times \vec{r}}{r^2}\right)\right]_i$$

$$= \varepsilon_{ijk}\varepsilon_{klm}\,\partial_j\left(\frac{\omega_l r_m}{r^2}\right)$$

$$= \varepsilon_{ijk}\varepsilon_{klm}\left[\omega_l \frac{\delta_{jm}}{r^2} - 2\omega_l r_m \frac{r_j}{r^4}\right]$$

$\varepsilon_{ijk}\varepsilon_{klm} = \delta_{il}\delta_{jm} - \delta_{im}\delta_{jl}$

$$= \delta_{il}\delta_{jm}\omega_l \frac{\delta_{jm}}{r^2} - 2\delta_{il}\delta_{jm}\omega_l r_m \frac{r_j}{r^4}$$

$$- \delta_{im}\delta_{jl}\omega_l \frac{\delta_{jm}}{r^2} + 2\delta_{im}\delta_{jl}\omega_l r_m \frac{r_j}{r^4}$$

$\delta_{il}\omega_l = \omega_i$

$\delta_{jm}\delta_{jm} = \delta_{jj}$

$$= \omega_i \underbrace{\delta_{jj}}_{3} \frac{1}{r^2} - 2\omega_i \frac{r_j r_j}{r^4} \quad \left(\frac{r^2}{r^4} = \frac{1}{r^2}\right)$$

$$- \underbrace{\delta_{jj}\delta_{jl}}_{\delta_{il}}\omega_l \frac{1}{r^2} + 2\omega_j r_i \frac{r_j}{r^4}$$

$\delta_{il}\omega_l = \omega_i$

$$= \frac{\omega_i}{r^2}(3 - 2 - 1) + 2r_i \frac{\vec{\omega}\cdot\vec{r}}{r^4}$$

$$= 2r_i \frac{\vec{\omega}\cdot\vec{r}}{r^4}$$

$\partial_i r_j = \delta_{ij}$

$\partial_i\left(\frac{1}{r^2}\right) = \frac{-2r_i}{r^4}$

$\vec{\nabla}\frac{1}{x^2+y^2+z^2}$