FÓRMULAS VECTORIALES

(1) $\vec{\mathbf{a}}\cdot(\vec{\mathbf{b}}\times\vec{\mathbf{c}})=\vec{\mathbf{b}}\cdot(\vec{\mathbf{c}}\times\vec{\mathbf{a}})=\vec{\mathbf{c}}\cdot(\vec{\mathbf{a}}\times\vec{\mathbf{b}})$

(2) $\vec{\mathbf{a}}\times(\vec{\mathbf{b}}\times\vec{\mathbf{c}})=(\vec{\mathbf{c}}\cdot\vec{\mathbf{a}})\cdot\vec{\mathbf{b}}-(\vec{\mathbf{b}}\cdot\vec{\mathbf{a}})\cdot\vec{\mathbf{c}}$

(3) $(\vec{\mathbf{a}}\times\vec{\mathbf{b}})\cdot(\vec{\mathbf{c}}\times\vec{\mathbf{d}})=(\vec{\mathbf{a}}\cdot\vec{\mathbf{c}})(\vec{\mathbf{b}}\cdot\vec{\mathbf{d}})-(\vec{\mathbf{a}}\cdot\vec{\mathbf{d}})(\vec{\mathbf{b}}\cdot\vec{\mathbf{c}})$

(4) $\vec{\nabla}\times(\vec{\nabla}\psi)=0$

(5) $\vec{\nabla}\cdot(\vec{\nabla}\times\vec{\mathbf{a}})=0$

(6) $\vec{\nabla}\times(\vec{\nabla}\times\vec{\mathbf{a}})=\vec{\nabla}(\vec{\nabla}\cdot\vec{\mathbf{a}})-\nabla^2\vec{\mathbf{a}}$

(7) $\vec{\nabla}\cdot(\psi\vec{\mathbf{a}})=(\vec{\nabla}\psi)\cdot\vec{\mathbf{a}}+\psi(\vec{\nabla}\cdot\vec{\mathbf{a}})$

(8) $\vec{\nabla}\times(\psi\vec{\mathbf{a}})=(\vec{\nabla}\psi)\times\vec{\mathbf{a}}+\psi(\vec{\nabla}\times\vec{\mathbf{a}})$

(9) $\vec{\nabla}(\vec{\mathbf{a}}\cdot\vec{\mathbf{b}})=(\vec{\mathbf{a}}\cdot\vec{\nabla})\vec{\mathbf{b}}+(\vec{\mathbf{b}}\cdot\vec{\nabla})\vec{\mathbf{a}}+\vec{\mathbf{a}}\times(\vec{\nabla}\times\vec{\mathbf{b}})+\vec{\mathbf{b}}\times(\vec{\nabla}\times\vec{\mathbf{a}})$

(10) $\vec{\nabla}\cdot(\vec{\mathbf{a}}\times\vec{\mathbf{b}})=\vec{\mathbf{b}}\cdot(\vec{\nabla}\times\vec{\mathbf{a}})-\vec{\mathbf{a}}\cdot(\vec{\nabla}\times\vec{\mathbf{b}})$

(11) $\vec{\nabla}\times(\vec{\mathbf{a}}\times\vec{\mathbf{b}})=\vec{\mathbf{a}}(\vec{\nabla}\cdot\vec{\mathbf{b}})-\vec{\mathbf{b}}(\vec{\nabla}\cdot\vec{\mathbf{a}})+(\vec{\mathbf{b}}\cdot\vec{\nabla})\vec{\mathbf{a}}-(\vec{\mathbf{a}}\cdot\vec{\nabla})\vec{\mathbf{b}}$

Si $\vec{\mathbf{r}}$ es el vector de posición de un punto con respecto a un cierto origen, de módulo $r=\left|\vec{\mathbf{r}}\right|$, y $\hat{\mathbf{n}}=\vec{\mathbf{r}}/r$ es un vector unitario radial, entonces:

(12) $\vec{\nabla}\cdot\vec{\mathbf{r}}=3$ (13) $\vec{\nabla}\times\vec{\mathbf{r}}=0$

(14) $\vec{\nabla}\cdot\hat{\mathbf{n}}\equiv\vec{\nabla}\cdot\left(\frac{\vec{\mathbf{r}}}{r}\right)=\frac{2}{r}$ (15) $\vec{\nabla}\times\hat{\mathbf{n}}\equiv\vec{\nabla}\times\left(\frac{\vec{\mathbf{r}}}{r}\right)=0$

(16) $(\vec{\mathbf{a}}\cdot\vec{\nabla})\hat{\mathbf{n}}\equiv(\vec{\mathbf{a}}\cdot\vec{\nabla})\left(\frac{\vec{\mathbf{r}}}{r}\right)=\frac{1}{r}[\vec{\mathbf{a}}-\hat{\mathbf{n}}(\vec{\mathbf{a}}\cdot\hat{\mathbf{n}})]\equiv\frac{\vec{\mathbf{a}}_{\perp}}{r}$

(17) $\vec{\nabla}\left(\frac{1}{r}\right)=-\frac{\vec{\mathbf{r}}}{r^3}$ (18) $\vec{\nabla}\left(\frac{1}{\left|\vec{\mathbf{r}}-\vec{\mathbf{r}}'\right|}\right)=-\frac{\vec{\mathbf{r}}-\vec{\mathbf{r}}'}{\left|\vec{\mathbf{r}}-\vec{\mathbf{r}}'\right|^3}$

(19) $\nabla^2\left(\frac{1}{r}\right)=-4\pi\delta(\vec{\mathbf{r}})$ (20) $\nabla^2\left(\frac{1}{\left|\vec{\mathbf{r}}-\vec{\mathbf{r}}'\right|}\right)=-4\pi\delta(\vec{\mathbf{r}}-\vec{\mathbf{r}}')$