Assignment - 2

$\vec{\nabla} \to$ Grad operator

$\phi = \phi(x, y, z)$

$\psi = \psi(x, y, z)$

Prove that

1) $\vec{\nabla}(\phi\psi) = \phi\vec{\nabla}\psi + \psi\vec{\nabla}\phi$

2) $\vec{\nabla}\cdot(\phi\vec{A}) = \phi\,\vec{\nabla}\cdot\vec{A} + \vec{A}\cdot\vec{\nabla}(\phi)$

$\vec{A} = \vec{A}(x, y, z) \to$ vector $\phi = \phi(x, y, z) \to$ scalar

Hints: $\vec{A} = \hat{x}A_x + \hat{y}A_y + \hat{z}A_z$

Note $\to$ $A_x = A_x(x, y, z) \to$ coefficient of $\hat{x}$

$A_y = A_y(x, y, z) \to$ " " $\hat{y}$

$A_z = A_z(x, y, z) \to$ " " $\hat{z}$

~~3) $\vec{B}\cdot(\phi\vec{A}) = (\phi\vec{B})\vec{A}$~~

3) $\vec{\nabla}\times(\phi\vec{A}) = \phi(\vec{\nabla}\times\vec{A}) + (\vec{\nabla}\phi)\times\vec{A}$

4) $\vec{B}\cdot(\phi\vec{A}) = (\phi\vec{B})\cdot\vec{A} = \phi(\vec{A}\cdot\vec{B})$

$\vec{A}, \vec{B} \to$ vectors $\phi \to$ scalar