

SOME FAMOUS VECTOR IDENTITIES (Prove them)

Suppose that $f(x, y, z)$ is a scalar function, and $\underline{E}(x, y, z)$ and $\underline{G}(x, y, z)$ are vector fns.

$$\textcircled{1} \operatorname{div}(\operatorname{curl} \underline{E}) = 0$$

$$\textcircled{2} \operatorname{div}(f \underline{E}) = f \operatorname{div} \underline{E} + \nabla f \cdot \underline{E}$$

$$\textcircled{3} \nabla \times (f \underline{E}) = f (\nabla \times \underline{E}) + (\nabla f) \times \underline{E}$$

$$\textcircled{4} \operatorname{div}(\underline{E} \times \underline{G}) = \operatorname{curl} \underline{E} \cdot \underline{G} - \underline{E} \cdot \operatorname{curl} \underline{G}$$

$$\textcircled{5} \operatorname{curl}(\nabla f) = \nabla \times \nabla f = \underline{0}$$