Summary of Coordinate Transformations

Cartesian to Cylindrical
Cylindrical to Cartesian

Cartesian to Spherical
Spherical to Cartesian

Divergence Theorum and Curl

Gradient - Scalar Field
Divergence - Vector Field

If $\nabla \cdot \vec{A} = 0$ then $\vec{A}$ = solenoidal vector fied (whatever goes in comes out)

Divergence Theorum

$$\int_V \nabla \vec{A} \cdot dV = \oint_S \vec{A} d\vec{S}$$

$$\int_V \nabla \vec{D} \cdot dV = \oint_S \vec{D} d\vec{S}$$

Circulation of $\vec{A}$ around countour C

$$\Delta \oint_C \vec{A} d\vec{l}$$

*** Δ is underlined in Nguyen's notation. Look into this.

Curl

$$\nabla \times \vec{A} = \frac{1}{\Delta s} \lim_{\Delta s \to \emptyset} \oint_S \vec{A} d\vec{l}$$

Stoke's Theorum

$$\int_S \nabla \times \vec{A} \cdot d\vec{s} = \oint_C \vec{A} \cdot d\vec{l}$$

Two Null Identitites

$$\nabla \times (\nabla V) \equiv 0$$

$$\nabla \cdot (\nabla \vec{A}) \equiv 0$$

Maxwell's Equations