

Review of Divergence and Stoke's Theorems

A. Begin by writing down the divergence theorem. Try to do this without referring to your notes!

The integral form of Gauss' law is: $\oiint \vec{E} \cdot d\vec{a} = \frac{Q_{encl}}{\epsilon_0}$

Write down the relationship between Q_{encl} and the charge density ρ .

Use the divergence theorem to *derive* the differential form of Gauss' law from the integral form. Be sure to briefly explain each of your steps.



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B. Now, write down Stokes' theorem (the "curl theorem"). Again, try to do this without referring to your notes.

The integral form of Ampere's law is: $\oint \vec{\mathbf{B}} \cdot d\vec{\ell} = \mu_0 I_{encl}$

Write down the relationship between I_{encl} and the current density $\vec{\mathbf{J}}$.

Use Stokes' theorem to *derive* the differential form of Ampere's law from the integral form. Be sure to briefly explain each of your steps.

