Prerequisites | Special Relativity

Refath Bari 6/26/20

Prerequisites

These are the concepts that one must know inside-out to be involved in Special Relativity:

1. Partial Derivatives
2. Integrals (surface, Line, Volume, Double, Triple)
3. Green's Theorem
4. Divergence Theorem
5. Gradient, Divergence, Curl
6. Coordinate Systems (Cartesian, Spherical, Cylindrical)

Main Questions

These are the concepts I'm struggling to understand right now. Overcoming these obstacles will mean answering these questions:

1. What's Gradient? Divergence? What's the difference?
2. How can I find the divergence in a Spherical Coordinate System?
3. How can I find the Unit Vectors in a Spherical Coordinate System?
4. How do you translate from cartesian to cylindrical coordinates?
5. When Can I construct a special gaussian surface? When is it applicable?
6. What are the main forms of symmetric electric fields/surfaces? I.e., plane, line, etc.
7. What is the divergence in a curvilinear coordinate system? How can I use that General formula to find the divergence in a Spherical/cylindrical system?
8. What's the difference between a partial derivative and an actual derivative?