1. **Some particles carry electrical charge. Experiments suggest that there are two kinds of charges. Suppose there were three kinds of charges in nature which we call red, blue and green. Charges of the same kind repel while charges of different kind attract. Ofcourse there are particles which neither repel nor attract other particles. You can't see the colors on the particles. You can only observe the repulsion and attraction between the particles. Treating these repulsion and attraction as relations on the set of particles how will you partition the particles and thus discover the existence of the three kinds of charges.**

2. **Find the volume of the tetrahedron whose vertices are** $(0,0,0), \quad (a,0,0), \quad (0,b,0), \quad (0,0,c)$**.**

3. **Evaluate** $(\hat{r}\cdot\vec{\nabla})r$ **and** $(\hat{r}\cdot\vec{\nabla})\hat{r}$

4. **Find the area of an ellipse** $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ **using the double integral** $\int\int dxdy$ **with appropriate limits.**

5. **Find the volume of an ellipsoid** $\frac{x^2}{a^2}+\frac{y^2}{b^2}+\frac{z^2}{c^2}=1$ **using the tripple integral** $\int\int\int dxdydz$ **with appropriate limits.**

6. **Let** $\vec{E}=\frac{\rho\vec{r}}{3\epsilon_0}$ **where** ρ **and** ϵ_0 **are constants. Evaluate** $\int(\vec{\nabla}\cdot\vec{E})dxdydz$ **over the volume of a sphere of radius** a **centered at the origin.**