PHYS 313

HW 02: Assignment 2

Due on February 13th, 2025 at 11:59 PM

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Problem 1.39:

1. Check the divergence theorem for the function $\vec{v}_1 = r^2\hat{\mathbf{r}}$, using as your volume the sphere of radius R, centered at the origin.

2. Do the same for $\vec{v}_2 = \frac{1}{r^2}\hat{\mathbf{r}}$.

Solution

Problem 1.43:

Let $\boldsymbol{r}$ be the separation vector from a fixed point (x', y', z') to the point (x, y, z), and let r be its length. Show that

1. $\nabla\left(r^2\right) = 2r$.
2. $\nabla(1/r) = -\hat{r}/r^2$.
3. What is the general formula for $\nabla\left(\tau^n\right)$?

Solution

Problem 1.47:

Solution

Problem 1.48:

Solution

Problem 2.1:

Solution

Problem 2.2:

Solution