# ELECTROMAGNETISM - PROBLEM SET 4

Problem sets are not for assessment.

1. If a point charge $q$ is located at $\vec{r}_1 = (a, 0, 0)$ and a point charge $-2q$ is located at $\vec{r}_2 = (0, b, 0)$, calculate the electric potential $V(\vec{r})$, where $\vec{r} = (0, 0, c)$.

2. If the electric potential in a region of space is $V(\vec{r}) = \alpha z - \beta xy$, where $\alpha$ and $\beta$ are constants, compute the electric field $\vec{E}(\vec{r})$.

3. For the scalar field $\phi(\vec{r}) = x^3 + y^3 + z^3$, compute the gradient $\vec{\nabla}\phi(\vec{r})$.

4. For the vector field $\vec{A}(\vec{r}) = xz\,\vec{e}_x + z\,\vec{e}_y - xy\,\vec{e}_z$, compute the divergence $\vec{\nabla} \cdot \vec{A}(\vec{r})$.

5. For the vector field $\vec{A}(\vec{r}) = xz\,\vec{e}_x + z\,\vec{e}_y - xy\,\vec{e}_z$, compute the curl $\vec{\nabla} \times \vec{A}(\vec{r})$.