① If $\vec{r} = x\hat{i} + y\hat{j} + z\hat{k}$. H.W. Show that $\text{div}\,\vec{r} = 3$, $\text{curl}\,\vec{r} = \vec{0}$.

② Find the divergence and curl of the vector $\vec{V} = xyz\hat{i} + 3x^2y\hat{j} + (xz^2 - y^2z)\hat{k}$ at $(2, -1, 1)$.

Ans. 14, $2\hat{i} - 3\hat{j} - 14\hat{k}$

③ Prove that $(y^2 - z^2 + 3yz - 2x)\hat{i} + (3xz + 2xy)\hat{j} + (3xy - 2xz + 2z)\hat{k}$ is both solenoidal and irrotational.