You know the drill!

1. (10pts) Consider the surface of a unit two-sphere $S^2$ with line element $ds^2 = d\theta^2 + \sin^2(\theta)d\phi^2$. Find the explicit form of the divergence operator on a vector function $V^\mu(\theta, \phi)$ in the coordinate basis.
2. \textit{(10pts)} If a vector $V^\mu$ is covariantly constant, i.e. $\nabla_v V^\mu = 0$, can you show that this implies that the corresponding dual vector $V_\mu$ is covariantly constant? If so, prove it. If not, what is different about this case than for the metric $g_{\mu\nu}$ (where $\nabla_v g_{\mu\lambda} = 0 \Rightarrow \nabla_v g^{\mu\lambda} = 0$)?