General Relativity HW 3 Quiz Name_____

You can try both problems below, but you will only receive credit for the most correct solution.

1. (*10pts*) Given $T_{\mu\upsilon}=\begin{pmatrix} 1 & 2 & -1 \\ -2 & 1 & 1 \\ -1 & 1 & 1 \end{pmatrix}$ in a space with metric $g_{\mu\upsilon}=\begin{pmatrix} -1 & 0 & 0 \\ 0 & 1/2 & 0 \\ 0 & 0 & 1/2 \end{pmatrix}$, determine the components of $T^{[\mu\upsilon]}$.

Turn over for second problem!

2. (*10pts*) Given $\mathrm{F}_{\mu\upsilon}=\begin{pmatrix} 0 & -E_x & -E_y & -E_z \\ E_x & 0 & B_z & -B_y \\ E_y & -B_z & 0 & B_x \\ E_z & B_y & -B_x & 0 \end{pmatrix}$ show that $\partial_\mu F^{\nu\mu} = J^\nu$ where $J^\nu = (\rho, J^x, J^y, J^z)$ implies that $\vec{\nabla} \cdot \vec{E} = \rho$.