

Homework problems #6

1. Show that

$$T^{\mu\sigma}{}_{\lambda;\rho} = \frac{\partial}{\partial x^\rho} T^{\mu\sigma}{}_{\lambda} + \Gamma_{\rho\nu}^{\mu} T^{\nu\sigma}{}_{\lambda} + \Gamma_{\rho\nu}^{\sigma} T^{\mu\nu}{}_{\lambda} - \Gamma_{\lambda\rho}^{\kappa} T^{\mu\sigma}{}_{\kappa}$$

is a tensor for general coordinate transformations.

2. Prove that the Leibniz rule holds for covariant differentiation of a product of two tensors:

$$(A^{\mu}{}_{\nu} B^{\lambda})_{;\rho} = A^{\mu}{}_{\nu;\rho} B^{\lambda} + A^{\mu}{}_{\nu} B^{\lambda}{}_{;\rho}$$