

E. 14 Show that

$$-\frac{1}{4} G_{\lambda\rho}^a(x) G^{a\lambda\rho}(x) =$$

$$-\frac{1}{2} \text{Tr} (G_{\lambda\rho}(x) G^{\lambda\rho}(x))$$

where $G_{\lambda\rho}(x)$ is the field strength matrix for the gluons.

E. 15 Show that a gauge transformation for the ^{quarks and the} gluon potentials as given in the lecture leads to

$$G_{\lambda\rho}(x) \rightarrow U(x) G_{\lambda\rho}(x) U^\dagger(x),$$

$$D_\lambda q(x) \rightarrow U(x) D_\lambda q(x),$$

$$\mathcal{L}_{\text{QCD}}(x) \rightarrow \mathcal{L}_{\text{QCD}}(x).$$