

## Homework 9

1. (30 points) Derive the total cross section of virtual - photon nucleon scattering for transverse and longitudinal photons. Express the inclusive electron - nucleon cross section through  $\sigma_T$  and  $\sigma_L$ .

2. (30 points) Derive the cross section of deep - inelastic electron - nucleon scattering in parton model. Obtain the Callan - Gross relation.

3. (10 points) Show that due to Callan - Gross relation

$$\frac{\sigma_L}{\sigma_T} \rightarrow 0 \text{ for large } q_0 \text{ (or } \nu) \text{ and fixed } x.$$