1. Calculate at order $g^2$ the field renormalizations $Z_A$, $Z_\psi$ for gluons and quarks in QCD. Also calculate the coupling constant renormalization $Z_g$. Do not use background field gauge to relate $Z_g$ to $Z_A$, rather calculate the vertex diagram like you did in QED. Assume there are $n$-types of quarks.

2. Using the results from problem 1 calculate the one-loop beta function $\beta(g)$ for the QCD coupling.