Problems for "The evolving cosmological constant (problem)"

Ex. 1: Suppose that the cosmological constant is given by

$$\lambda = \lambda_{\rm bar} + \frac{1}{2}\sum_{i=1}^{J} n_i^2 q_i^2$$

$\lambda_{\rm bar}$ is a bar cosmological constant that is of the order of $-M_P^4$. q_i are some fixed charges of the order of $1/10$ and $n_i = 0, \pm 1, \pm 2, ...$ are the number of these charges. How big J should be so that there exists a set of n_i such that

$$|\lambda| < \Delta\lambda \sim 10^{-120}.$$

Ex. 2: Consider a $SU(N_c)$ gauge theory that couples to N_f fermions. Suppose that at the Planck scale the coupling constant is g_P. Use the 1-loop approximation to the β-function to find the strong coupling scale associated with this gauge group. Under which conditions it is exponentially small relative to the Planck scale.