

### Problem set # 3

1)

a) Use group theory tables to compute the matter content of supergravity multiplets in various dimensions and with 32 supercharges. Specify the different fields and their multiplicity. For each space-time dimension  $d$  compute the dimension of the moduli space of vacua for  $d=3, \dots, 9$ .

b) Find the coset space,  $G/H$  which is the scalar manifold of the theory, with  $G$  the non-compact version of the  $E_n$  algebra and  $H$  is its maximal compact subgroup. Recall  $n=11-d$ .

c) How many different types of cosmic strings can we have in 4 dimensions with this amount of supersymmetry? (think about this problem in relation to Polchinski's upcoming colloquium on Thursday, Sep. 23, 2005.)