Exercises - May 30, 2006

1. Verify equation (8.1.8) in Polchinski.

2. $**$ The action in (8.1.9) depends on various parameters, such as the string length $l_s = \sqrt{\alpha'}$, the parameter ρ defined by $\rho = Re^{\sigma}$ and g_s which is defined as $g_s = \kappa_0 e^{\Phi_d}$. Now assume that $d = 4$ and that we want that charges are quantized in units of the electron charge (charge is proportional to momentum in the 5th dimension - convince yourself of this). We also want the Coulomb interaction strength to come out correctly, and we want a correct Newton's constant. These three constraints can be used to determine l_s, ρ and g_s. Find their values and verify that we need a radius of the order of the four-dimensional Planck length to achieve all of this.