

## Week 2 (due April 13)

1. Problem V.3. in Wess and Bagger.
2. Problem VI.3. in Wess and Bagger.
3. (a) Show that the model with three chiral superfields  $X, Y, Z$  and superpotential

$$W(X, Y, Z) = mYZ + hX(Z^2 - \mu^2),$$

where  $m, h, \mu$  are nonzero complex numbers, breaks supersymmetry spontaneously.

(b) Compute the potential. Determine for which values of the parameters the space of vacua (i.e. the space of minima of the potential) has dimension greater than zero. In this case one says that there is a moduli space of vacua.

(c) Determine the values of the parameters for which  $X = Y = Z = 0$  is a vacuum. Find the masses of all one-particle excitations (both bosonic and fermionic) in this vacuum. (Hint: you should find one massless fermion, i.e. the goldstino).