

Exercise 2

1. Starting from the theory with superpotential

$$W = M_{ij}\phi^i\phi^j + \lambda_{ijk}\phi^i\phi^j\phi^k ,$$

show that this superpotential is not renormalized.

2. Consider the theory with superpotential

$$W = \frac{M}{2}\phi_1^2 + y\phi_1\phi_2^2 + \lambda\phi_2^3 + \frac{1}{\mu}\phi_1\phi_2^3 ,$$

Using holomorphy and symmetries find the form of the the low-energy effective superpotential that arises when the heavy field  $\phi_1$  is integrated out of the theory.