

UNIVERSITY OF CALIFORNIA, SANTA BARBARA
Department of Physics

Physics 221B

Quantum Field Theory

Winter 2015

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ASSIGNMENT #6

Due: Mon., Feb. 23, in class.

1. Extend the counting of degree of divergence in d dimensions to vertices containing n_s scalar fields, n_d derivatives, and n_ψ Dirac fermion fields. Do this by two methods: #1) graph topology, where you now have to count internal propagators of different types, and #2) dimensional analysis of couplings. Give all n_s, n_d, n_ψ that lead to renormalizable couplings (those that do not increase the degree of divergence) in $d = 2, 3, 4$.

2. Srednicki 14.2 (volume of the unit sphere in R^d).