Homework 9

1. Construct an explicit Majorana representation for gamma matrices in $d = 3$ and $d = 4$ Lorentzian spacetimes. (Recall that a Majorana representation is such that the Lorentz generators $S^{\mu\nu} = \frac{i}{4}[\gamma^\mu, \gamma^\nu]$ are purely imaginary, so that the group transformations are real.) Argue that no Majorana representation exists in $d = 3$ Euclidean dimensions.

2. Srednicki problem 14.3.

3. Srednicki problem 14.5.

4. Srednicki problem 18.1

5. Write down all the renormalizable interactions for a field theory with a single scalar field $\phi(x)$ in two, three, four, five and six dimensions.