Exercise sheet 12
Theoretical Physics 6a (QFT): WS 2017-2018
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Exercise 1. (100 points) : Self-energy in scalar QED

(a)(50 points)
Calculate the self-energy graphs for a scalar particle in QED in dimensional regularization.
(b)(20 points)
What are the mass and field strength counterterms in dimensional regularization in the $\overline{MS}$ scheme?
(c)(20 points)
What is the final (finite) expression for the renormalized propagator at one-loop level? Work out the remaining Feynman parameter integral.
(d)(10 points)
Express the above used $\overline{MS}$ mass in terms of the pole mass for the scalar propagator at one-loop level.