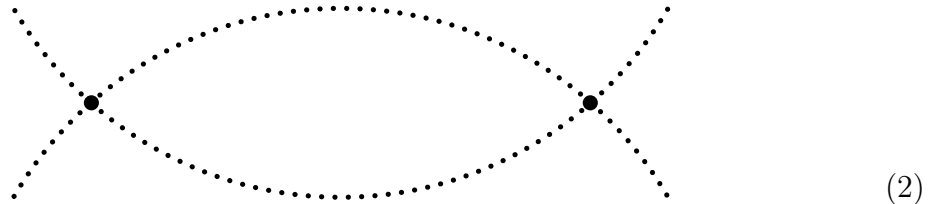


1. First, a calculational exercise. In class, I described the higher-derivative UV regularization scheme in which propagators behave at high Euclidean momenta as

$$\dots\dots\dots = \frac{1}{p^2 + m^2} - \frac{1}{p^2 + \Lambda^2} \approx \frac{1}{\Lambda^{-2}p^4 + p^2 + m^2}. \quad (1)$$

Use this UV cutoff to calculate the scalar loop



Your result should have the same form as the loop with a hard-edge cutoff, provided the respective cutoff parameters are related according to

$$\Lambda_{\text{higher-derivative}}^2 = \Lambda_{\text{hard-edge}}^2 \times \text{a numerical constant}. \quad (3)$$

2. And now a reading assignment, §7.3 of the *Peskin & Schroeder* textbook. Read about the *Optical Theorem* in QFT and Cutkoski's cutting rules.