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

\[ \frac{1}{p^2 + m^2} - \frac{1}{p^2 + \Lambda^2} \approx \frac{1}{\Lambda^2 p^4 + p^2 + m^2}. \]  

(1)

Use this UV cutoff to calculate the scalar loop

(2)

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

\[ \Lambda_{\text{higher-derivative}}^2 = \Lambda_{\text{hard-edge}}^2 \times \text{a numerical constant}. \]  

(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.