QFT Homework 9 Due 24 Nov 2022

This homework is due to `https://uwcloud.uwinnipeg.ca/s/Xks9XWXz9yo5CpG` by 10:59PM on the due date. Your file(s) must be in PDF format; they may be black-and-white scans or photographs of hardcopies (all converted to PDF), PDF prepared by LaTeX, or PDF prepared with a word processor *using an equation editor*.

Reading Assignment: Srednicki chapters 27, 28.

For a grade Submit your answers for the following questions

1. **Mass and Coupling Renormalization** *Srednicki 27.1* Presentation: Zunaira
2. **Renormalization of ϕ^4** *Srednicki 28.1* Presentation: Bardh

Not to be marked Do not submit your answers for the following questions

3. **Complex ϕ^4** *Srednicki 28.2* Presentation: Naman

   If the counterterms are $Ak^2 + Bm^2$ for the propagator and $Z_\lambda = 1 + C$ for the propagator, we found previously (in ungraded problems) that (through order λ^1) $A = 0$ and

   $$B = \frac{\lambda}{16\pi^2}\left[\frac{1}{\varepsilon} + \frac{1}{2} + \ln(\mu/m)\right] \ , \quad C = \frac{5\lambda}{16\pi^2}\left[\frac{1}{\varepsilon} + \frac{1}{5} + \ln(\mu/m)\right] \ .$$

4. **Some Renormalization Systematics** *Srednicki 28.3(b)* Presentation: Phil

   Note that part (b) is self-contained, so you should not need the results of part (a) (involving loop diagrams).