Tadpole Method of Computing Veff

$$V(\phi) = -\sum_n \frac{1}{n!}\Gamma^{(n)}(0,\ldots,0)\,[\phi_c(x)]^n$$ (definition of Veff)

Let $\phi_c(x) = h(x) - \omega$

$$= -\sum_n \frac{1}{n!}\Gamma^{(n)}(0,\ldots 0)\,[h(x)-\omega]^n$$

$$\left.\frac{\partial V}{\partial h}\right|_{h=\omega} = -\sum_{n=1}^{\infty} \frac{n}{n!}\Gamma^{(n)}(0)\,[\cancel{h(x)}^{\,\omega} - \omega]^{n-1}$$

only case $n=1$ survives.

$$= \Gamma^{(1)}(0,\omega) =$$ 

Calculate tadpole graphs using Feynman Rules of the shifted theory.

So, now integrate over ω:

$$\left.\frac{\partial V}{\partial h}\right|_{h=\omega} = \Gamma^{(1)}(\omega)$$

$$V(h) = \int_0^h \Gamma^{(1)}(\omega)\,d\omega.$$

↑ can ignore const.