Homework 2; due Tuesday, Sept 24

1. Compute the 1-loop contribution to $\ln(Z/Z_0)$ for $S(x) = x^2/2 - g(x + x^3/6)$. Using this, compute the number of labeled n-vertex 1-loop graphs with 1-valent and 3-valent vertices only.

2. Find the generating function $\sum a_n z^n/n!$ for the numbers a_n of labeled n-vertex trees with 1-valent and 4-valent vertices. You may express the answer via inverse functions to polynomials.

3. Find the one-loop contribution to the effective action for $S(x) = x^2/2 + gx^3/3!$. That is,one has $S_{eff} = S + \hbar S_1 + O(\hbar^2)$, and you need to find S_1. Which Feynman diagrams need to be considered?