

Series 5

I. Expanding the normal integral

Consider

$$\tilde{Z}(J) = e^{-\frac{\lambda}{4i}(\frac{d}{dJ})^4} e^{\frac{1}{2m^2}J^2}. \quad (1)$$

1. Extract the term of order λ and J^2 with the right numerical factors.
2. Extract the term of order λ^2 and J^2 with the right numerical factors.
3. Extract the term of order λ and J^6 with the right numerical factors.

II. Diagrams for the normal integral

Draw the diagrams corresponding to the terms of the last exercise:

1. λ and J^2
2. λ^2 and J^2
3. λ and J^6

III. Wick contractions for the normal integral

Recalculate the terms of the first exercise via Wick's method

1. λ and J^2
2. λ^2 and J^2
3. λ and J^6