

14-1350-AKT Makeup Final

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You have 3 hours to write this exam. Answer the following 3 questions.

1. Write an essay explaining how the space of chord diagrams modulo 4T relations appears naturally within knot theory.
2. Write an essay explaining how framings arise when trying to define a "self-linking number" using configuration space integrals.
3. Explain how trivalent graphs arise when one is trying to compute the Taylor series expansion in the variable ϵ of Z_ϵ/Z_0 , where

$$Z_\epsilon = \int_{\mathbb{R}^n} e^{i(\frac{1}{2} \lambda_{ij} x_i x_j + \frac{1}{6} \lambda_{ijk} x_i x_j x_k)} d\vec{x}$$

Here both λ_{ij} and λ_{ijk} are symmetric.

Readability matters! The ideal solution of each of the above problems should look like the best explanation of the answer one could give on about 3 pages of a typical math book (with some space taken by formulas and drawings), except the handwritten version may be shorter or longer, depending on your handwriting.