Okayama University
Faculty of Science

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RIIS

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Exercises for Advanced Physics 2, 2019 term 4

Exercise Set 2
(Due date: Tuesday, December 24, 2019)

Exercise 2 (**Temperature corrections for the Pauli susceptibility**) (10 points)

(a) Explain the susceptibility of the electron gas due to the electron spin in your own words and give the reason why it is temperature independent.

(b) Reconsider the derivation for the Pauli susceptibility of free electrons, assuming finite temperature. Use the Sommerfeld expansion for simplification. What is the temperature dependence of the susceptibility now?

Hint: As mentioned in class, partial integration allows you to get rid of the derivative of the Fermi function in the expression of the Pauli susceptibility.