

## Exercises in Statistical Mechanics

Based on course by Doron Cohen, has to be proofed  
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This exercises pool is intended for a graduate course in “statistical mechanics”. Some of the problems are original, while other were assembled from various undocumented sources. In particular some problems originate from exams that were written by B. Horovitz (BGU), S. Fishman (Technion), and D. Cohen (BGU).

### ===== [Exercise 7050]

#### The Drude formula

Consider a ring of length  $L$ , with a particle that has the Drude velocity-velocity correlation function with a time constant  $\tau$ . The temperature is  $T$ .

- (a) Find the conductance of the ring using the canonical FDT.
- (b) What is the conductance if there are  $N$  fermions at zero temperature instead of a single particle.
- (c) What is  $\tau$ , and hence what is the conductance, if the scattering in the ring is due to a stochastic segment that has a transmission  $g$ .