Homework 9

1. (60 points) Derive the commutation / anticommutation properties of second - quantization operators for free Bosons and Fermions in the momentum space.

2. (40 points).

(a) Calculate $N \mid p_1\, p_2\, p_3 > = 3 \mid p_1\, p_2\, p_3 >$, where N is the Bosonic number operator defined as $\int a^{+}(p)\, a(p)\, d^3 p$

(b) Show the same for two fermion wave function for the state of $\mid p_1\, p_2 >$ where $N = \int b^{+}(p)\, b(p)\, d^3 p$

3. (80 points) Derive distribution function for Bolzman Statistics