Fermi-Dirac Quantum Gas Problem 1: μ and n_0 and n_1 for a small number of particles

Using the programs that you've written for quantum gases, carry out the following calculations for Fermi-Dirac statistics. Set the box size $L = \pi$.

1. For the extreme cases of $N = 1, 2, 3$, and 4, compute the chemical potential μ and the occupations of the two lowest energy states as functions of the temperature.

   Don't include temperatures below $T = 0.2$ in your computations. There are numerical difficulties at very low temperatures that are not worth worrying about for this assignment.

   Go up to about $T = 3.0$ for $N = 1$, $T = 5.0$ for $N = 2$ and 3, and $T = 7.0$ for $N = 4$.

2. Are the Fermi energies you found in your computations consistent with what you had expected? Explain.

3. Explain the occupation number you found in your computations at low temperatures for a state with energy $\epsilon = 6A$ for $N = 2$ and $N = 3$.