Summary of lecture 15

- We calculated the pressure in a Fermi gas at zero temperature:

$$p = \frac{2}{5}\frac{N}{V}\epsilon_F$$

- And showed that a Fermi gas is classical only if

$$T \gg T_F$$

- I also quoted without any derivation the correction to the internal energy at small but non-zero values of temperature:

$$U \approx \frac{3}{5}N\epsilon_F + \frac{\pi^2}{4}N\epsilon_F\left(\frac{k_BT}{\epsilon_F}\right)^2$$

- From which we determined the heat capacity:

$$C_V \approx \frac{\pi^2}{2}Nk_B\left(\frac{k_BT}{\epsilon_F}\right)$$

- And presented a “back of the envelope” derivation of the same result (up to a factor ~2).