1. /5/ A particle is moving along the $x$-axis in the potential field $U(x) = \alpha |x|^s$, where $\alpha$ and $s$ are positive constants. Using the Bohr-Sommerfeld quantization rule, find the energy spectrum of bound states $E_n$.

2. /6/ Consider an atom with the nucleus of charge $Z$ and two electrons. Using the uncertainty principle, estimate ground state energy for this atom (do not forget the Coulomb repulsion between the electrons). Compare your predictions with experimental data:
   - negative hydrogen ion $\text{H}^- = -1.05$,
   - He atom $-5.81$,
   - positive ion $\text{Li}^+ = 15.12$,
   - $\text{Be}^{++} = 28.12$,
   - $\text{B}^{+++} = 45.12$,
   - $\text{C}^{++++} = 66.12$
   (all energies in Ry).

   b. Merzbacher, Exercise 3.18, p. 43.

4. /7/ Merzbacher, Problem 2, p. 49.

5. /7/ Merzbacher, Problem 3, p. 49.