SCPY322 Nuclear and Particle Physics
Problem Set # 3 - Nuclear Decay Processes
Date: March 25, 2021. Due date: April 2, 2021 (put in my mail-box)

1. (30 pt.) Natural gold $^{197}_{79}Au$ is unstable against alpha decay, with alpha kinetic energy of 3.3 MeV. Estimate the lifetime of this decay, using Geiger-Nuttall law.

2. (30 pt.) The half-life of a radioactive isotope is strongly depend on the energy E liberated in the decay. The energy-dependent of the half-life time of the α emitter follows the Geiger-Nuttell law. Derive explicitly for the energy-dendent of a half-life time of the β-emitter, using Fermi's golden rule and relativistic energy expression of the beta.