An energy-level diagram for a hypothetical atom is shown above.

(a) Determine the frequency of the lowest energy photon that could ionize the atom, initially in its ground state.

(b) Assume the atom has been excited to the state at \(-1.0\) electron volt.
   i. Determine the wavelength of the photon for each possible spontaneous transition.
   ii. Which, if any, of these wavelengths are in the visible range?

(c) Assume the atom is initially in the ground state. Show on the following diagram the possible transitions from the ground state when the atom is irradiated with electromagnetic radiation of wavelengths ranging continuously from \(2.5 \times 10^{-7}\) meter to \(10.0 \times 10^{-7}\) meter.