1 Spin Fermi Estimate

The following two problems ask you to make Fermi estimates. In a good Fermi estimate, you start from basic scientific facts you already know or quantities that you can reasonably estimate based on your life experiences and then reason your way to estimate a quantity that you would not be able guess. You may look up useful conversion factors or constants. Use words, pictures, and equations to explain your reasoning:

(a) Imagine that you send a pea-sized bead of silver through a Stern-Gerlach device oriented to measure the z-component of intrinsic spin. Estimate the total z-component of the intrinsic spin of the ball you would measure in the HIGHLY improbable case that every atom is spin up.

(b) Protons, neutrons, and electrons are all spin-1/2 particles. Give a (very crude) order of magnitude estimate of the number of these particles in your body.