5. Pencil ***(6 points)*** We put the pencil with its graphite end against a horizontal sheet of paper, and push the other end with a fingertip (without holding between the fingers and thereby possibly giving a torque to it). Then, there will be a purely longitudinal stress inside the pencil (there is no bending of the pencil). If we push strongly enough, we may neglect the weight of the pancil in the balance of torque with respect to the fingertip. So, equilibrium implies that the resultant force of the friction and reaction forces at the graphite end are along the axis of the pencil. This is possible, if $\tan\alpha \leq \mu$, where α is the angle between the pencil and a vertical line. So, we increase α wile pushing the pencil, and determine the position α_0, when the pencil starts sliding; $\tan\alpha_0$ can be calculated as $\tan\alpha_0 = x/\sqrt{l^2 - x^2}$, where l is the length of the pencil, and x is the length of the projection of the pencil onto a horizontal plane.