A uniform rod of mass $M$ and length $L$ is placed at right angles to an edge of a horizontal table. The center of mass $C$ of the rod projects a distance $d$ beyond the edge at $A$. The coefficient of static friction equals $\mu$. The rod, flat on the table, is released at rest. It starts to rotate about $A$ and eventually slides off the table.

(a) Calculate the moments of inertia of the rod, $I_C$ about point $C$ and $I_A$ about point $A$. You may express the answers for parts (b)-(d) below in terms of $I_C$ and $I_A$.

(b) Calculate the angular velocity $\omega$ of the rod as a function of the rotation angle $\theta$ before sliding occurs.

(c) The force acting on the rod by the table edge has a component in a direction perpendicular to the rod. Calculate this component $N$ as a function of $\theta$ before sliding occurs.

(d) Calculate the angle $\theta$ when sliding begins.