Phys 124 @ Rutgers

tutorial #1

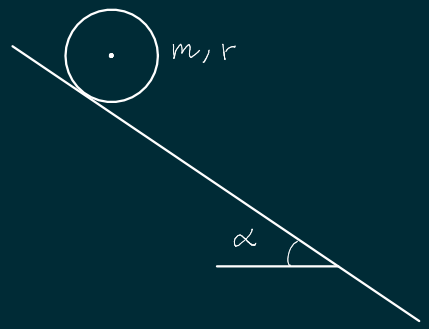
dynamics of rotational motion

(2d)

Problem set #1

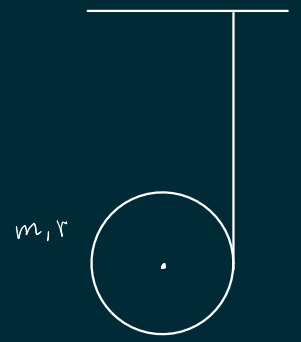
Problem #1

A Sphere with mass m and radius r is coming down a slope α without slipping. Draw the forces acting on this sphere. Discuss friction force, and find the acceleration of the sphere.



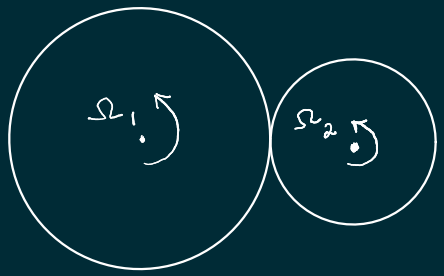
Problem #2

A pulley with mass m and radius r falling down opening the rope around it, see the figure. What is the acceleration? Consider pulley is a solid uniform disk.



Problem #3

Two disk with moments of inertia, I_1 and I_2 which was rotationg with angular velocities ω_1 and ω_2, recpectively, brought together at one point, as shown in picture. There is friction so the disks reaches final angular velocitis Ω_1 and Ω_2. Find them. If the friction force is f how long it takes for these disks to reach the final state.



Problem #4

Consider a cylinder with mass m and radius r which rotates around its axis with angular velocity ω_0. We put this cylinder on a surface with kinetic friction coefficient μ_k. Discuss the friction force. How long it takes for this cylinder to start rolling without any slipping?