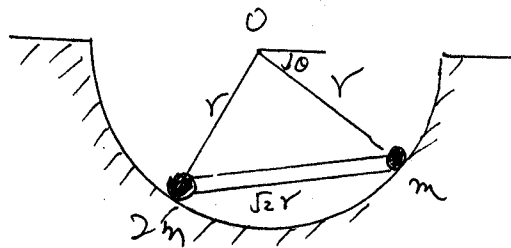
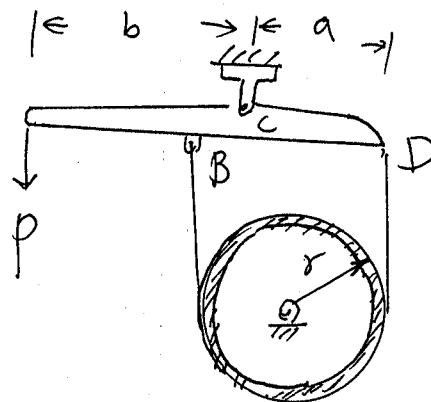


1. Two particles having masses m and $2m$ are connected by a massless rod to form a dumbbell. It can slide without friction in a circular bowl of radius r . Consider a virtual displacement $\delta\theta$ and use the principle of virtual work to obtain the value of θ at the position of static equilibrium.



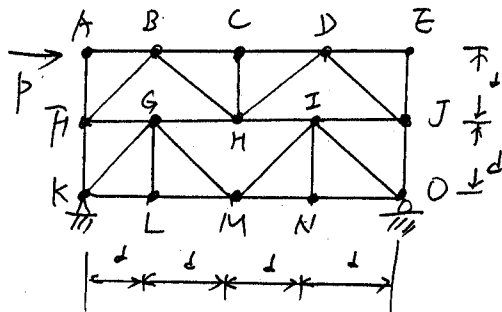
(25%)

2. A brake drum of radius $r = 150\text{ mm}$ is rotating counterclockwise when a force of magnitude 60 N is applied at A. Knowing that the coefficient of kinetic friction is 0.4 , determine the moment about O of the friction forces applied to the drum when $a = 200\text{ mm}$ and $b = 300\text{ mm}$.



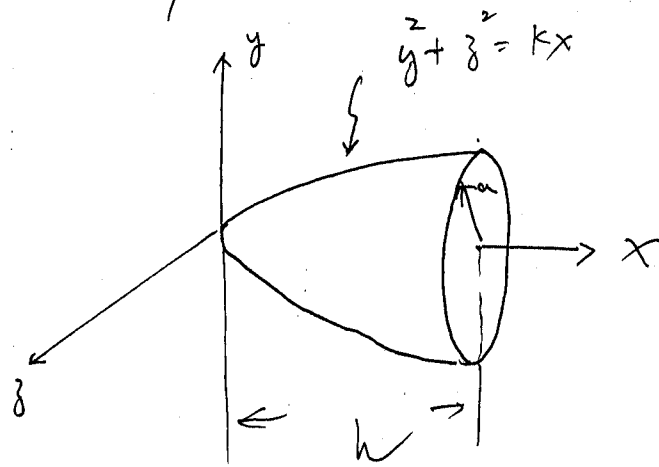
(28%)

3. Determine the forces in members F_{JK} and F_{JO} of the truss shown.



(25%)

4. Determine by direct integration the mass moment of inertia and the radius of gyration with respect to the y axis of the paraboloid shown, assuming a uniform density and a mass m .



(25%)