Homework H.4.A

**Given:** Particle P (of mass m) moves along a rough surface (with a coefficient of kinetic friction of μ_k between P and the surface). At one instant when P is at a position on the path that has a radius of curvature of ρ, P has a speed of v with the velocity vector for P being oriented at a clockwise angle of θ from the vertical.

Find: For this position,
(a) Determine the normal component of force of the path acting on particle P.
(b) Determine the rate of change of speed of particle P.
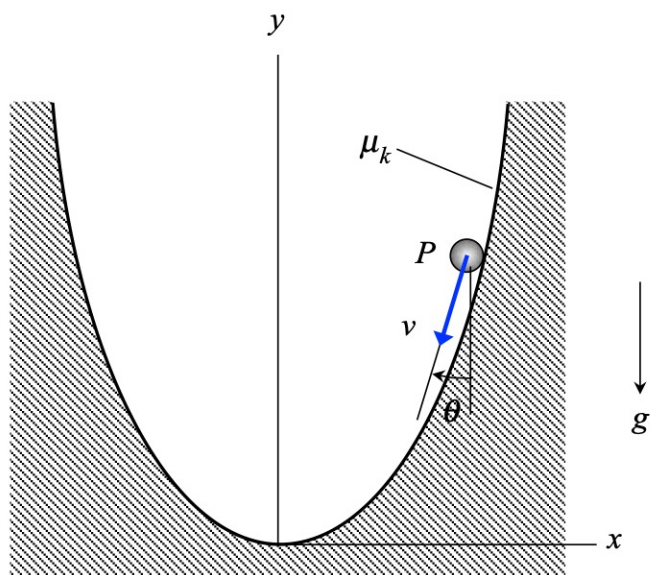
Use the following parameters in your analysis: $\mu_k = 0.2$, $m = 4$ kg, $\rho = 0.5$ m, $\theta = 36.87°$ and $v = 30$ m/s.