PHYS UN1601 Recitation Week 10 Demonstration Problems

TA: Nitya Nigam

November 13, 2024

Problem 1

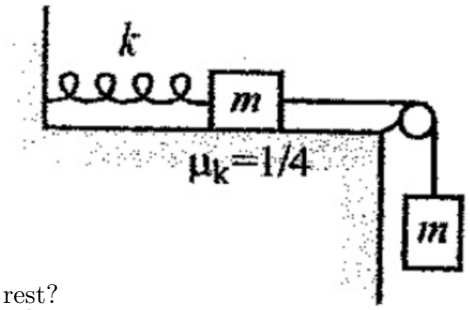
A platform has a rope attached to it which extends vertically upward, over a pulley, and then back down. You stand on the platform. The combined mass of you on the platform is m.

a) Some friends standing on the ground grab the other end of the rope and hoist you up to a height h at constant speed. What is the tension in the rope? How much work do your friends do?

b) Consider instead the scenario where you grab the other end of the rope and hoist yourself up a height h at constant speed. What is the tension in the rope? How much work do you do?

Problem 2

Consider the system shown to the right, with two equal masses m and a spring with spring constant k. The coefficient of kinetic friction between the left mass and the table is $\mu = \frac{1}{4}$, and the pulley is frictionless. The system is held with the spring at its relaxed length and then released.



a) How far does the spring stretch before the masses come to rest?

b) What is the minimum value of the coefficient of *static* friction for which the system remains at rest once stopped?

c) If the string is then cut, what is the maximal compression of the string during the resulting motion?