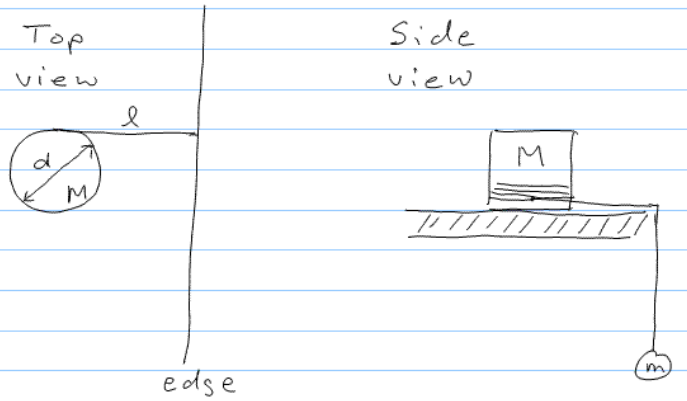
Assignment 1 - Hints

Note Title 8/30/2007

1.2 Picture:



Moment of inertia of a cylinder is $\frac{1}{2}MR^2$ (radius R)

1.4 If rocket ejects mass with momentum dp_0 in time dt, propulsion force is $F_0 = dp_0/dt$.

Also, the total force on the rocket, F, gives

$$F = \frac{dp}{dt} \quad \text{for} \quad p = mv$$

But here, both m and v are changing in time.

Ultimate, you want to get an expression for $\ddot{h}$ and integrate it twice to get $h(t)$.

(No hints for 1.7!)

1.11 When discussing the qualitative orbits, find an expression for the maximum of V_{eff}, and classify the orbits based on their energy in relation to this.

For the bound orbits, show that the time it takes to travel from some small r to the origin is finite, and also that the polar angle ϕ remains finite while this occurs. For small r, you can approximate the required integrals and simply do them.

Neglect relativistic effects. In reality, these will become important as $r \to 0$.