HW #1

(1.) Goldstein Ch. 1, Ex. 12 (escape velocity)

Note:
$$\begin{cases} G = 6.67 \times 10^{-11} \frac{m^3}{kg \cdot s^2} & \text{gravitational constant} \\ M = 5.98 \times 10^{24} kg & \text{Earth mass} \\ R = 6.38 \times 10^{6} m & \text{Earth radius} \end{cases}$$

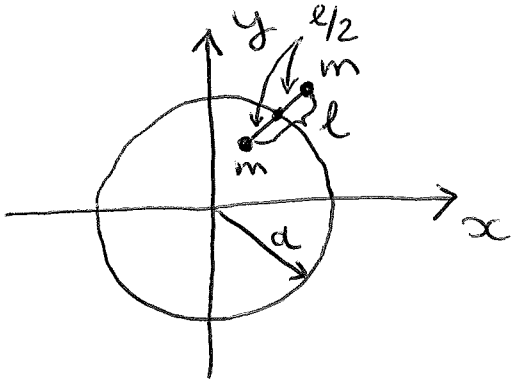
(2.) Goldstein Ch. 1, Ex. 13 (rockets)

Note: $v' = 2.1 \frac{km}{s}$ (typo in 2001 edition of the book)

$v' = |\vec{v}'|$

(3.) Goldstein Ch. 1, Ex. 14 (rod on a circle)

Note: This is a 2D system



(4.) Consider a single point particle whose mass m varies with time. The particle is subjected to an external force $\vec{F}$. Show that

$$\frac{d}{dt}(mT) = \vec{F} \cdot \vec{p}$$ for such a particle, where T is the kinetic energy and $\vec{p}$ is the linear momentum.