HW #1

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

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

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

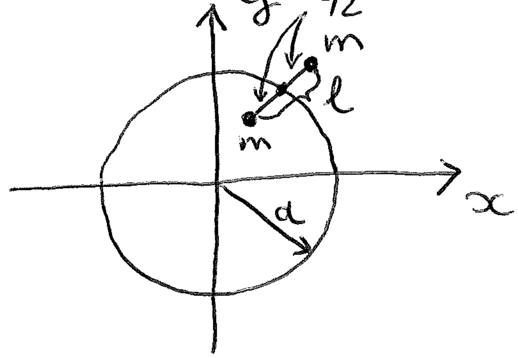
Note: $v' = 2.1 \, \dfrac{km}{s}$ (typo in 2001 edition of the book)

$\quad \| $

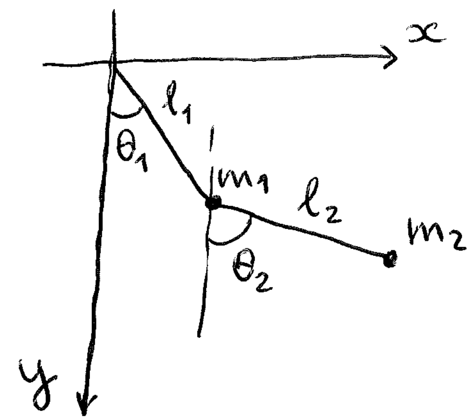
$|\vec{v}'|$

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

Note: This is a 2D system

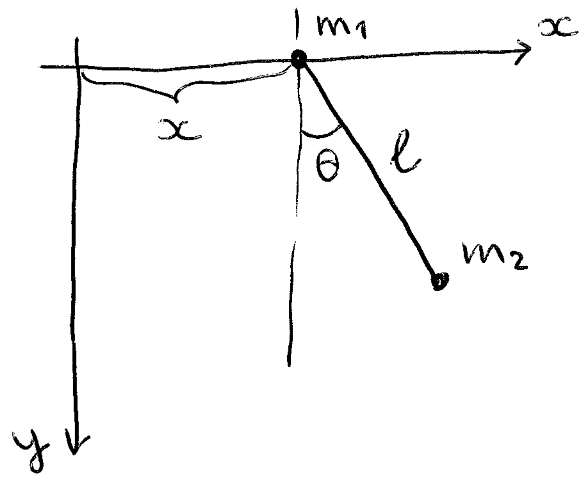


(4.) Find the Lagrangian $\mathcal{L}$ for the double pendulum:



generalized coords:
$\{\theta_1, \theta_2\}$

(5.) Find the Lagrangian $\mathcal{L}$ for the sliding pendulum:



generalized coords:
$\{x, \theta\}$

Note: m_1 can slide along the x-axis
(no friction)