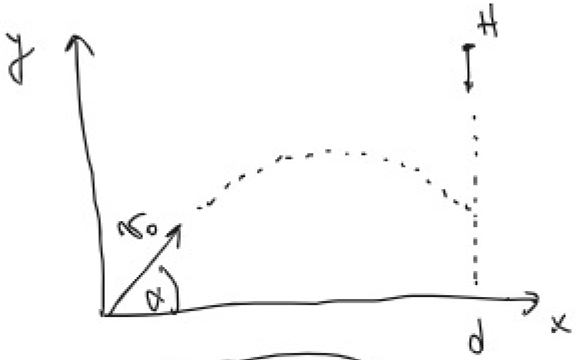
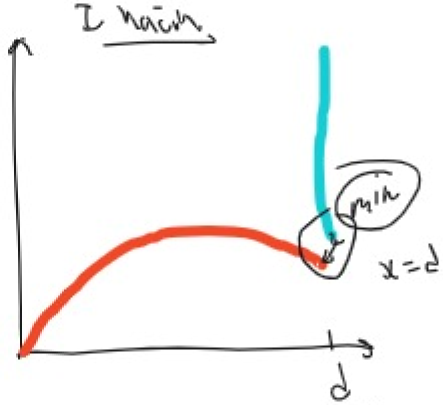


$$\alpha = \arctg \frac{H}{d}$$

$$V_0 \in [v_0^{min}, \infty)$$

$$v_0^{min} = \sqrt{\frac{gH}{2\sin^2\alpha}}$$

I način



$$r = \sqrt{(x_1-x_2)^2+(y_1-y_2)^2}$$

$$r \to r_{min}$$

II način

$y = ?$

$y_{top} = ?$

$$\underbrace{\min(\mathrm{abs}(y - y_{top}))}_{\text{rešenje}}$$

3. Odrediti do koje visine će se popeti telo koje je brzinom v_0 bačeno sa Zemlje vertikalno u vis, ako na njega deluje sila obrnuto srazmerna kvadratu rastojanja od centra Zemlje:

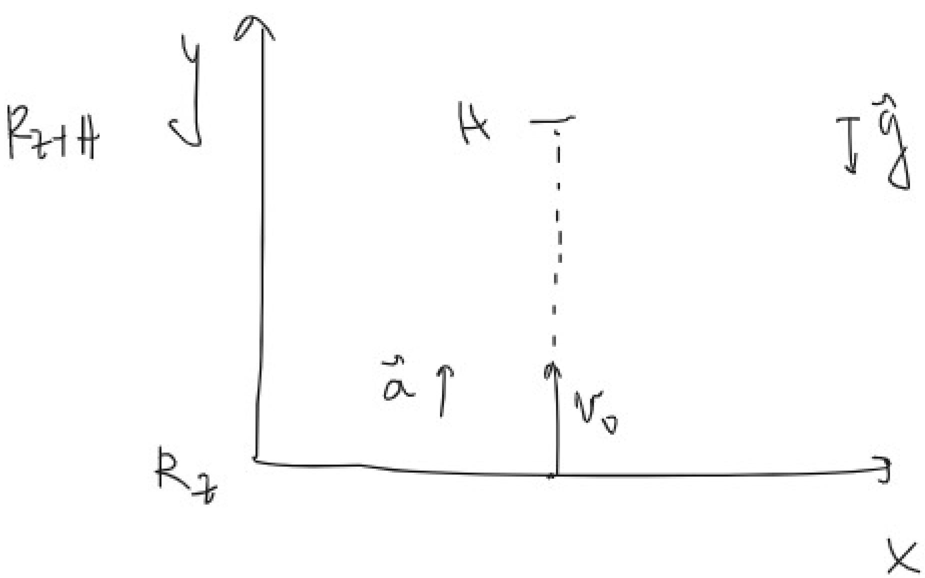
$$\longrightarrow \quad \vec{F} = \gamma \frac{mM}{r^2}\left(-\vec{e}_y\right)$$

gde su $\gamma = 6,67 \times 10^{-11} \dfrac{\text{m}^3}{\text{kg s}^2}$ gravitaciona konstanta, $M = 5,972 \times 10^{24}$kg masa Zemlje, $R = 6,371 \times 10^6$m srednji poluprečnik Zemlje, r rastojanje od centra Zemlje, a m masa tela;

a) korišćenjem konstantnog vremenskog koraka Δt, kao i korišćenjem koraka koji je funkcija ubrzanja tela dat kao $\frac{C}{a}$, gde je a ubrzanje tela usled Zemljine gravitacije, a C konstanta takva da u početnom trenutku vremeski korak bude Δt, a zatim odrediti relativnu grešku svake visine u odnosu na analitičku za $g \cancel{=}$ const., kao i vremena izvršavanja kodova i njihov odnos;

$g = f(r)$

$\vec{F} = m\vec{g}$ $\qquad \vec{g} = -\overbrace{\underbrace{\frac{\gamma M}{r^2}}}\vec{e}_y$



$\downarrow\vec{g}$ $\downarrow\vec{F}$

$r \equiv y$

$m\vec{a} = \vec{F} = m\vec{g}$

$$a = -\frac{\gamma M}{y^2}$$

$$a = \frac{dv}{dt} = -\frac{\gamma M}{y^2}$$

$$-\frac{\gamma M}{y^2}\,dy = v\,dv \quad /\int$$

$$\gamma M \int_{R_Z}^{R_Z+y(t)} \left(-\frac{dy}{y^2}\right) = \int_{v_0}^{v(t)} v\,dv$$

$$\gamma M \left(\frac{1}{R_Z+y(t)} - \frac{1}{R_Z}\right) = \frac{v^2(t) - v_0^2}{2}$$

$$\cancel{m} a = -\cancel{m} \cdot \frac{\gamma M}{y^2}$$

$$\vec{a} = \frac{d\vec{v}}{dt} = \frac{d\vec{v}}{d\vec{r}} \cdot \frac{d\vec{r}}{dt} \quad \vec{v}$$

$$\vec{a} = \vec{v} \cdot \frac{d\vec{v}}{d\vec{r}}$$

$$\vec{a} \cdot d\vec{r} = \vec{v} \cdot d\vec{v}$$

$$a\,dr = v\,dv$$

$$y(t) = H \quad ; \quad v(t) = 0$$

$$\gamma M \left(\frac{R_z - (R_z + H)}{R_z (R_z + H)} \right) = -\frac{v_0^2}{2}$$

$$\frac{v_0^2}{2\gamma M} = \frac{\cancel{R_z} + H \cancel{- R_z}}{R_z (R_z + H)}$$

$$2\gamma M H = v_0^2 R_z^2 + v_0^2 R_z H$$

$$\boxed{H = \frac{v_0^2 R_z^2}{2\gamma M - v_0^2 R_z}}$$

dt

$DT(dt) = \frac{c}{a}\,dt$

$a = g = \frac{\gamma M}{r^2}$

$t = 0 \quad r = R_z$

$dt = \frac{c}{\frac{\gamma M}{R_z^2}} \Rightarrow \boxed{c = \frac{\gamma M\,dt}{R_z^2}}$ A

$DT = \frac{c}{\frac{\gamma M}{r^2}} = \frac{cr^2}{\gamma M}$