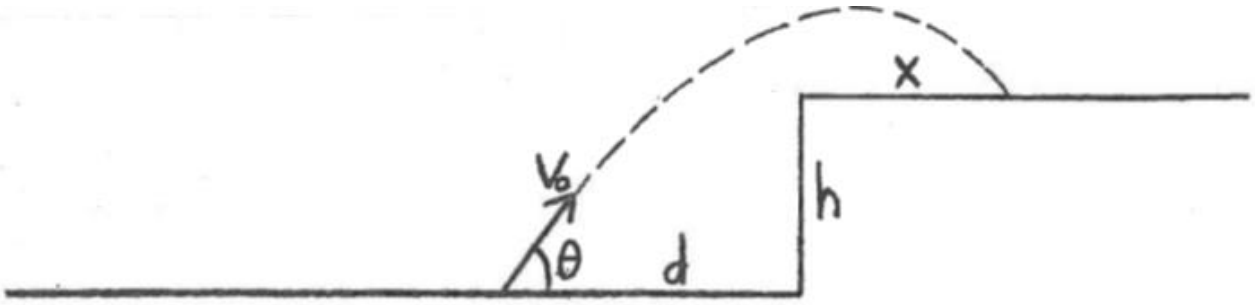
CSC 2262, Fall 2021, Lab 2



A projectile is fired at a horizontal distance d from the bottom of a cliff of height h with a muzzle velocity v_0 at an angle θ with respect to the horizontal, and strikes a target at a horizontal distance x from the top of the cliff, where d = 2235 m, h = 1125 m, v_0 = 315 m/s, x = 760 m, and the acceleration of gravity g = 9.81 m/s^2.

Write a MATLAB program to calculate and print the time t that the projectile is in the air, the firing angle θ IN DEGREES, the velocity v of the projectile at the time that it strikes the target, the maximum height y_{max} of the projectile, and the height y of the projectile at the time that it passes over the edge of the cliff, where t, θ, v, y_{max}, and y are given by

$$t = \frac{\sqrt{2(V_0^2 - hg) + 2\sqrt{(V_0^2 - hg)^2 - (h^2 + (d+x)^2)g^2}}}{g}$$

$$\theta = \cos^{-1}\left(\frac{d+x}{V_0 t}\right)$$

$$V = \sqrt{V_0^2 + g^2 t^2 - 2gtV_0 \sin(\theta)}$$

$$y_{max} = \frac{V_0^2 \sin^2\theta}{2g}$$

$$y = d\tan\theta - \frac{gd^2}{2V_0^2 \cos^2\theta}$$

The output of this program should look like this:

t=59.54429 theta=80.81177 v=277.76339 ymax=4928.39153 y=4132.71423