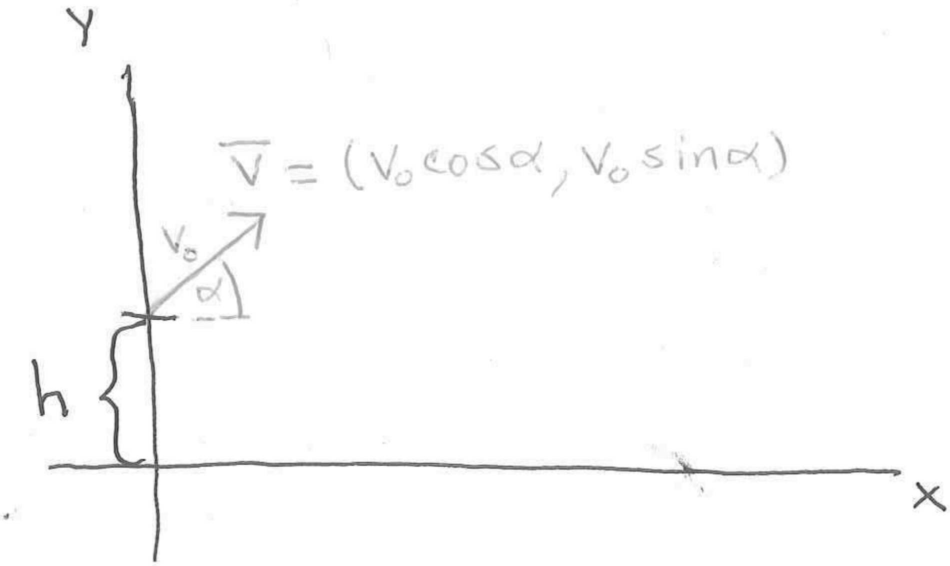

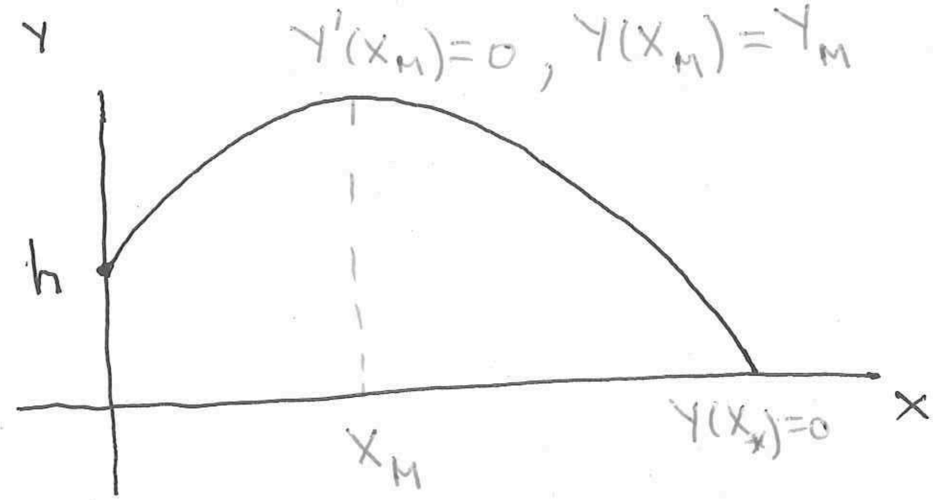

$\downarrow \overline{G}$

$G_x = 0 \quad G_y = -g$

$X'' = 0 \; ; \quad V(0) = x'(0) = V_0 \cos\alpha \; ; \quad X(0) = 0$

$X' = c = V_0 \cos\alpha$

$X = (V_0 \cos\alpha)\, t$

$$t = \frac{X}{V_0 \cos\alpha}$$

$$y'' = -g; \quad v(0) = y'(0) = v_0 \sin\alpha; \quad y(0) = h$$

$$y' = -gt + v_0 \sin\alpha$$

$$y = -\frac{1}{2}gt^2 + (v_0 \sin\alpha)t + h$$

$$= -\frac{1}{2}g\left(\frac{x}{v_0\cos\alpha}\right)^2 + v_0\sin\alpha\left(\frac{x}{v_0\cos\alpha}\right) + h$$

$$= -\frac{g}{2v_0^2\cos^2\alpha}x^2 + \frac{\sin\alpha}{\cos\alpha}x + h$$

$$y'(x) = -\frac{g}{v_0^2\cos^2\alpha}x + \frac{\sin\alpha}{\cos\alpha}$$

$$y'(x) = 0 \qquad x = \frac{v_0^2\cos\alpha\sin\alpha}{g} \qquad t = \frac{v_0\sin\alpha}{g}$$

$$y(x) = 0 \qquad x = \frac{-\tan\alpha \pm \sqrt{\tan^2\alpha + \frac{2gh}{v_0^2\cos^2\alpha}}}{-\frac{g}{v_0^2\cos^2\alpha}}$$

$$= \frac{v_0\cos\alpha}{g}\left(v_0\sin\alpha + \sqrt{v_0^2\sin^2\alpha + 2gh}\right)$$