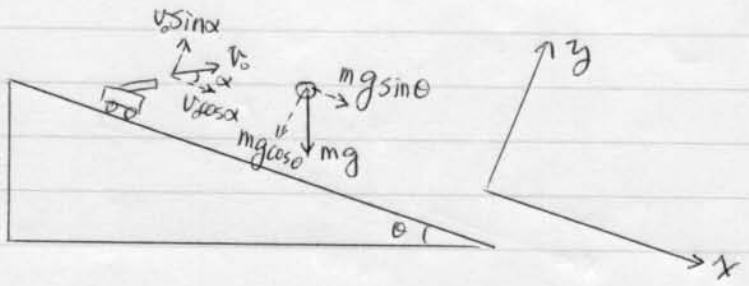
5.



In the x direction: $mg\sin\theta = ma_x \Rightarrow a_x = g\sin\theta$

$$x = v_0\cos\alpha\, t + \frac{1}{2}g\sin\theta\, t^2$$

In the y direction: $mg\cos\theta = ma_y \Rightarrow a_y = g\cos\theta$

$$y = v_0\sin\alpha\, t - \frac{1}{2}g\cos\theta\, t^2$$

$$\begin{cases} x = v_0\cos\alpha\, t + \frac{1}{2}g\sin\theta\, t^2 \\ y = v_0\sin\alpha\, t - \frac{1}{2}g\cos\theta\, t^2 \end{cases}$$

when it hits the hill. $y = 0$. $t = \dfrac{2v_0\sin\alpha}{g\cos\theta}$

$$x = v_0\cos\alpha\,\frac{2v_0\sin\alpha}{g\cos\theta} + \frac{1}{2}g\sin\theta\,\frac{2^2v_0^2\sin^2\alpha}{g^2\cos^2\theta}$$

$$= \frac{2v_0^2}{g\cos\theta}\sin\alpha\cos\alpha + \frac{2v_0^2\sin\theta}{g\cos^2\theta}\sin^2\alpha$$

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

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

$$\frac{dx}{d\alpha} = 0 \Rightarrow \cos^2\alpha\cos\theta - \sin^2\alpha\cos\theta + 2\sin\theta\sin\alpha\cos\alpha = 0$$

$$\cos 2\alpha\cos\theta + \sin 2\alpha\sin\theta = 0$$

$$\tan 2\alpha = -\cot\theta$$

$$\alpha = \frac{\theta}{2} - \frac{\pi}{4} \qquad \theta = 20^\circ$$

$$= -35^\circ$$