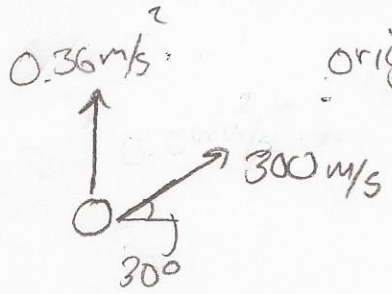
Name: Erik Sundblad **Worksheet 11**

Exercise 1. Suppose a crosswind induces an acceleration of $0.36 \frac{m}{s^2}$ toward the north on a projectile. The projectile has an initial speed of $300 \frac{m}{s}$ directed to the east at 30° above the horizontal. Describe where the object lands.

$\vec{V_0} =$



origin $\langle 0, 0, 0 \rangle$ $\downarrow 9.8\ m/s^2$

$\int \vec{a}(t) = \langle 0, 0.36, -9.8\ m/s \rangle$

$\int \vec{v}(t) = \langle C, 0.36t + 0, -9.8t + C \rangle$

$V(t) = \langle 300\cos 30, 0.36t, -9.8t + 300\sin 30 \rangle$

$\langle 300(\cos 30)(30.612), \frac{0.36(30.612)^2}{2}, 0 \rangle = \langle 7{,}953.29, 168.677, 0 \rangle$

$\langle 300\cos(30)t, \frac{0.36t^2}{2}, -\frac{9.8t^2}{2} + 300\sin(30) \rangle$

$4.9t = 300\sin(30) \Rightarrow t = 30.612$ $\quad 0 = -4.9(t)^2 + 300\sin(30)t$

Exercise 2. Consider the function $\mathbf{r}(t) = \langle 2\cos t, 2\sin t, 4t \rangle$, for $t \geq 0$. Find the arclength for $0 \leq t \leq 2$.

$|r(2) - r(0)| = \langle 2\cos(2), 2\sin(2), 8 \rangle - \langle 2\cos(0), 2\sin(0), 0 \rangle$

$\langle 2\cos 2 - 2, 2\sin \quad \rangle - \langle 2, 0, 0 \rangle$

$2\langle \cos(2), \sin(2), 4 \rangle$