1. Let $r(t)=\cos (2 \pi t) i+\sin (2 \pi t) j+t^{2} k$ for $0 \leq t \leq 4$. Draw a reasonable sketch of the associated curve, and give the equation of the tangent line to the curve at $t=2$.
2. For $r(t)=\cos (2 \pi t) i+\sin (2 \pi t) j+t^{2} k$, find $\int_{0}^{\pi} r(t) d t$.
3. Earth: A projectile is fired from the origin (the ground) at an initial speed of $100 \mathrm{~m} / \mathrm{s}$ and launch angle of $\pi / 3$. Find the object's position position after 10 seconds.
4. Planet $\Gamma$ : A projectile is fired from the origin (the ground) at an initial speed of $100 \mathrm{~m} / \mathrm{s}$ and launch angle of $\pi / 3$. Find the object's position position after 10 seconds. (note: gravity on Planet $\Gamma$ is $3 \frac{m}{s^{2}}$ ).
5. For problems 3) and 4), determine where the objects hits the ground.
6. Determine the maximum height achieved by the object on Planet $\Gamma$.
