

Problem 6: Write parametric equations to describe the curve traced by the following motion: A cannonball fired from $(0,0)$ with initial velocity 100 m/sec shot at an angle $\frac{\pi}{3}$ above the ground, with gravity $g = -9.8\text{ m/sec}^2$.
(Source: AoPS Calculus)

The parametric equations are

$$\begin{aligned}x(t) &= 100t \cos \frac{\pi}{3} \\&= 50t \\y(t) &= y_0 + v_0 t + \frac{1}{2}gt^2 \\&= 0 + 100t \sin \frac{\pi}{3} - 4.9t^2 \\&= (50\sqrt{3})t - 4.9t^2\end{aligned}$$

Thus the parameterization is $\boxed{(50t, 50t\sqrt{3} - 4.9t^2)}$.