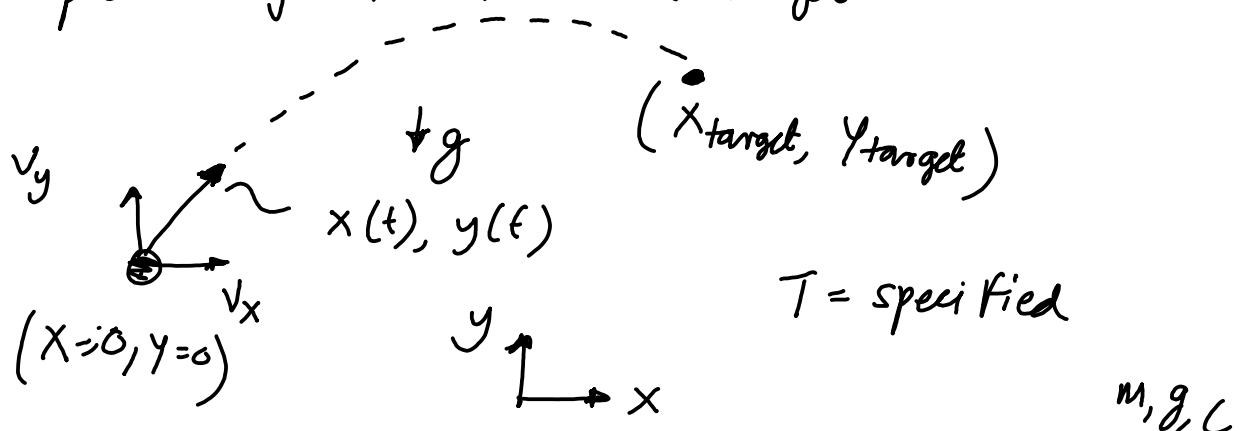


Example - Projectile to hit a target



$$z_0 = [v_x, v_y]:$$

$\text{fsolve}(\text{'eqn\_needs\_to\_be\_zeroed'}, z_0, \text{options}, \text{parameters})$

$$F = \begin{bmatrix} x(t=T) - X_{\text{target}} \\ y(t=T) - Y_{\text{target}} \end{bmatrix}$$

simulator to get this value, from equations of motion

$$\begin{bmatrix} \ddot{x} = -\frac{c}{m} \dot{x} \sqrt{\dot{x}^2 + \dot{y}^2} \\ \ddot{y} = -g - \frac{c}{m} \dot{y} \sqrt{\dot{x}^2 + \dot{y}^2} \end{bmatrix}$$

integrate for time  $T$

you get  $x(t=T), y(t=T)$

$\Rightarrow$  Boundary Value Problem