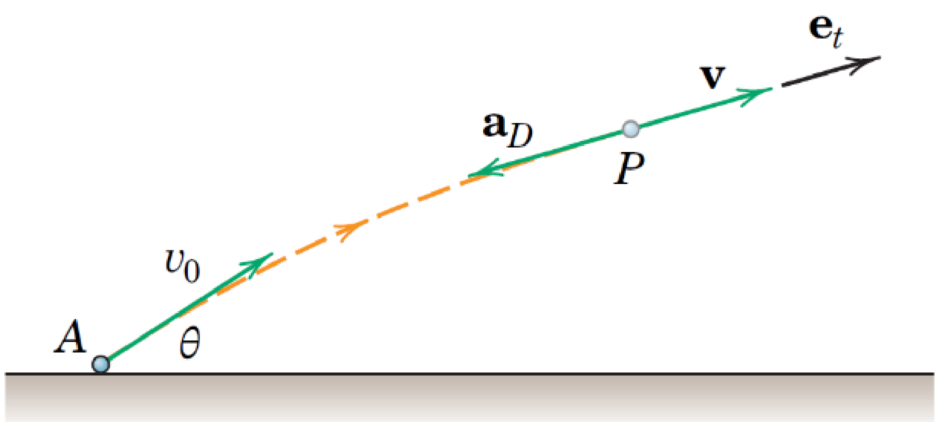
A particle P is launched from point A with the initial conditions shown.



a) Assume the aerodynamic drag is negligible and develop a computer code in MATLAB that receives v_0 and θ and an arbitrary time t_p as inputs and generates the following outputs:
   - Range of the projectile R
   - Maximum height H
   - Velocity vector at any arbitrary time t_p (magnitude and angle)
   - Projectile position at any arbitrary time t_p
   - Velocity components in polar coordinates at any time t_p
   - Radius of curvature of the projectile path at any time t_p

   Also
   - Plot the path of motion (y *vs*. x).
   - Plot radius of curvature of the projectile path as a function of time.
   - Plot velocity components in rectangular coordinates v_x and v_y as functions of time.
   - Plot velocity components in polar coordinates v_r and v_θ as functions of time.

b) Now, assume the particle is subjected to aerodynamic drag. The acceleration due to aerodynamic drag has the form $\boldsymbol{a}_D = -kv^2\boldsymbol{e}_t$, where k is a positive constant, v is the particle speed, and $\mathbf{e}_t$ is the unit vector associated with the instantaneous velocity $\boldsymbol{v}$ of the particle. The unit vector $\mathbf{e}_t$ has the form $\mathbf{e}_t = \frac{v_x\mathbf{i}+v_y\mathbf{j}}{\sqrt{v_x^2+v_y^2}}$, where v_x and v_y are the instantaneous x- and y-components of particle velocity, respectively.
   Develop another computer code for this case, capable of generating all items asked for in part (a) (constant k should be given as an input for this part).

c) Run your computer codes and present your results for the numerical values listed in the Table.

	v_0 (m/s)	θ (deg)	t_p (s)	k (m^{-1})
1	65	35	2	0
2	25	40	2.5	0.006
3	70	30	3	0.008