ZCE 111
Assignment 3

Q1. Concave lens

Develop a code that reads in supplied values of f of a concave lens, h_o, x_o of an object and does the following:

- visualise the set-up, display the object, image, lens, focal point and optical axis graphically.

- form the image of the object via the geometrical ray tracing method.

- Visualise your output for x_o varies from $0.2f$ till $3f$ at an interval of $0.1f$.

- Your code should also display the information (in the label of your Graphics[]) about the properties of the image, that whether it is virtual/real, inverted/erect and magnified/dimishined.

Q2. Two Projectiles

- Two projectile are launched. Projectile is launched at location (0,0) at $t=0$. Projectile 2 is launched at location (95,100.0) at $t=8.5$ seconds later. The initial speed and angle are for the first projectile are 18 m/s and 49 Degree above the $+x$ axes; while that for projectile 2 are 15 m/s and 56 Degree above the $+x$ axes.
- (i) Write a code to display the simulation of the motion of these two particles.
- (ii) Calculate the distance between these two projectiles as a function of time between $t=0$ until $t=16$ seconds.
- (iii) What is the distance between them when $t=7.9$ s?

Q3. Two uncoupled pendulums

- (i) Simulate the motion of two uncoupled SHM pendulums with different lengths, released at different initial displacement angles, and from the vertical.
- (ii) For a fixed choice of initial displacement angles and lengths, plot the graph of phase difference between these two pendulums, defined as $\Delta\phi = \theta_2 - \theta_1$, where $\theta_i, i = 1,2$ are the displacement angles of the pendulums at time t.