

ZCE 111
Assignment 4

Q1. Measuring the speeds of a planet orbiting in an ellipse

- Consider a planet is orbiting along an ellipse with semi-major $a=2$ and semi-minor axis $b=1$.
- By creating a list for the locus of the planet in the ellipse at different time step,
- (i) “measure” the speed of the planet moving in the ellipse in each time step.
- (ii) Plot the speed of the planet as a function of time. Does the planet move at the same or different speed in the ellipse? Which are the locations in the orbit where the speed is largest? Smallest?
- (iii) “Measure” and plot the angular speed of the planet as a function to time. Does the angular speed changes with time along the orbit?

Q2. Fitting a blackbody radiation data set to retrieve its corresponding temperature

- The data from the measurement of the radiance, R , vs wavelength, λ , both in S.I. unit, at an unknown temperature can be download from <http://www2.fizik.usm.my/tlyoon/teaching/ZCE111/1415SEM2/assignment/blackbody.dat>. Write a code to determine the temperature at which the radiance data was measured. Do you know what is the significance of the temperature corresponding to this data?

Q3. Finding the center of an ellipse

- The (x,y) coordinates of an ellipse with semi-major axis $a=2$ and semi-minor axis $b=1$ centered at (h,k) can be download from http://www2.fizik.usm.my/tlyoon/teaching/ZCE111/1415SEM2/assignment/ellipse_unknown_centers.dat. Write a code to determine the center of the ellipse.

Q4. Finding initial launching angle and speed of a 2D projectile.

- The (x,y) coordinates of a projectile launched at $(0,0)$ with unknown initial speed and angle can be download from http://www2.fizik.usm.my/tlyoon/teaching/ZCE111/1415SEM2/assignment/projectile_unknown_initial_values.dat. Write a code to determine the initial speed v_0 and launching angle θ .