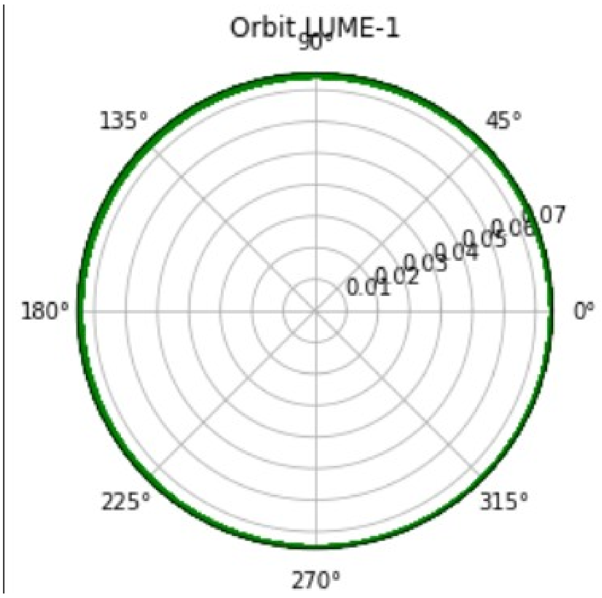
Practice 2 report

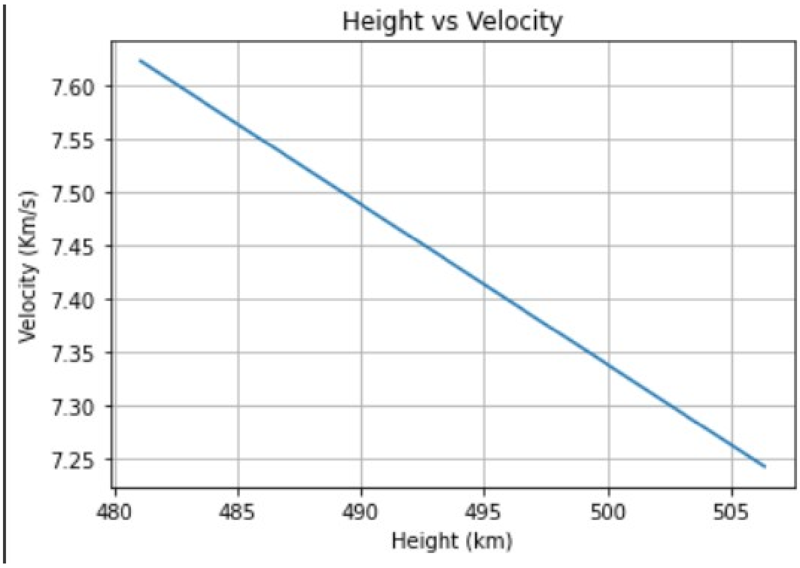
Before starting the practice we must do some initial calculations, in these we calculate we find values like the mean anomally or the mean motion, we get these values from link given to statement and corresponds to the satellite LUME-1. We also calculate the constant mu = G*M.

Part 1:

This section is very similar to the previous practice, first we calculate the speed with the formulas that appear in the statement and then we calculate the height, in the same way as in the previous practice. With these data we can draw the orbit of the satellite, as seen in the drawing is almost circular, this is because the eccentricity is very small, almost zero.



Finally, we draw the graph that relates velocity and height, as they are inversely proportional , the graph will be a descending line, because at higher speed the height will decrease.



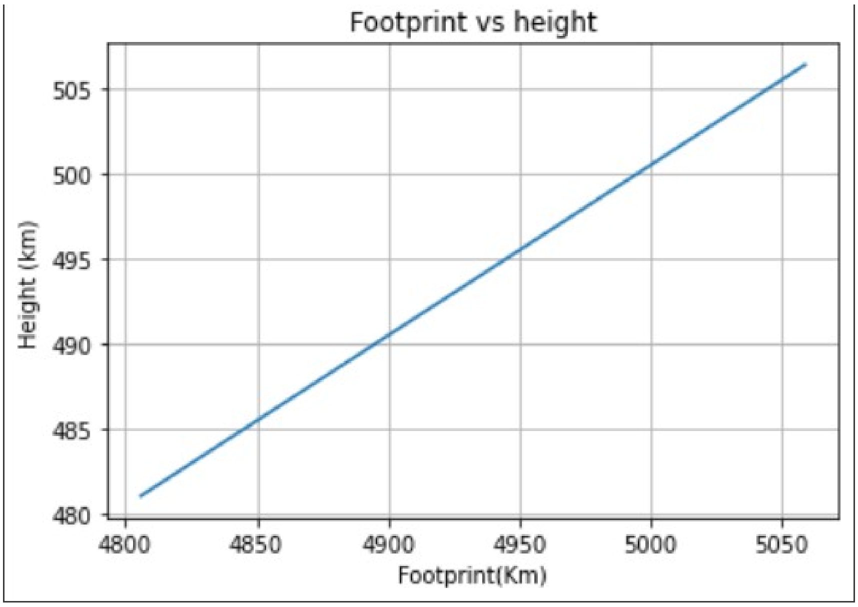
Part 2:

The footprint is the part of the earth that we can see from a satellite, obviously,if the height of the satellite is greater the footprint will have a higher value

To calculate the footprint we find the angle fi ,that is half of the total angle that we can see, this angle is from the radius of the earth and the distance from the satellite to the earth, after finding it we multiply it by two, after finding it we multiply it by two.

To find the we multiply the percentage of the earth that we see from the satellite (the angle obtained) by the radius of the earth and we get the final number of kilometers that can be seen.

Finally, draw the relationship between the height and the footprint, As is obvious, the higher the height, the footprint, because being higher we can see more from the satellite.



Part 3

In this exercise we are going to draw the trajectory of the satellite LUME-1, we are going to do this with the given rotation matrices

For the satellite we consider a circular orbit and we will use an inertial reference system then we have to make some changes of coordinates.

First , we find the position of the satellite in the perifocal coordinates, we rotate xp about the Z axis and we get the first matrix. Second, we rotate to obtain a vector perpendicular to the equatorial plane and we get the second matrix. Then we rotate on the z axis with respect to right ascension we get the thirdmatrix. Finally we rotate about the meridian of Greenwich and we get the final matrix.

Once we have done that we already have X,Y and Z, then we apply the algorithm described in practice and we find the declination(latitude) and alfa (longitude).

Substituting those values in the given code we get satellite orbit drawing, Part 4

For this exercise they give us almost all the code already, the only thing we have to calculate is the latitude and longitude.

This values we get them from the geocentric and and so we get the vector with the variation of latitude and longitud.