[mex45] The comet and the planet

A comet moves along a parabolic orbit which brings it to a distance d from the sun at its closest point. A planet circles the sun at radius R in the same plane. (a) Find the fraction of a planetary year which the comet spends inside the planetary orbit as a function of d/R. (b) Show that this fraction cannot exceed the value $2/3\pi$ no matter what the value of d/R is. Use the results of [mex44] for the parabolic motion. The masses of the comet and the planet are very small compared to the mass of the sun.

Solution: