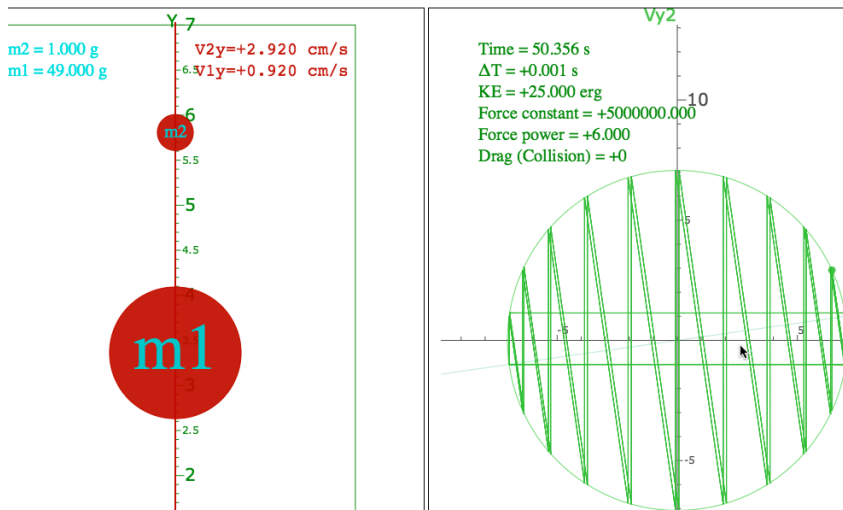
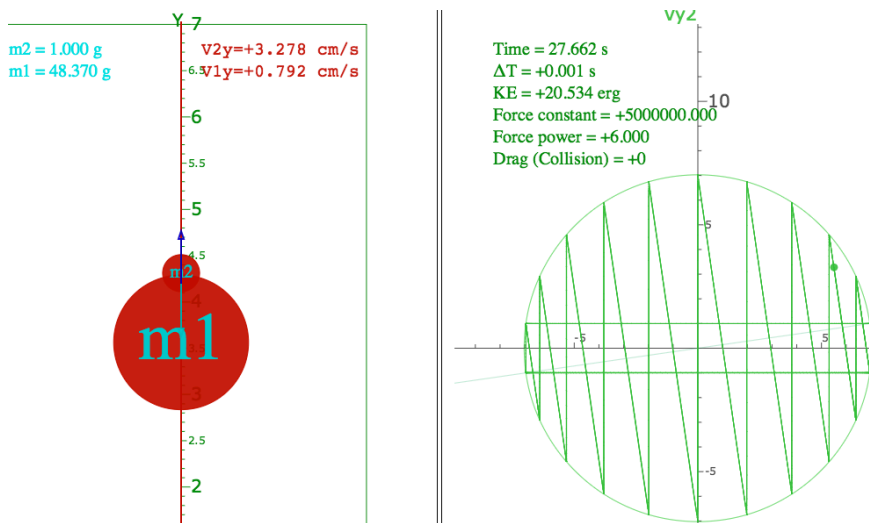


Pseudo-Rotations

Exercise 4.1 Estrangian plot in text Fig. 4.2 (Details on p.64 of *Lect. 3to4x*. See p.131, too.) has mass ratio $M_1/m_2 = 49/1$ and has nearly (but not quite) periodic path plot. (Let the pen-mass be $m_2=1$ here.)



Changing to $M_1 = 48.37$ gives more nearly periodic paths shown below. (Seems perfect but it's not.)
 (Experiment using BounceIt on web. <http://www.uark.edu/ua/modphys/markup/BounceItWeb.php>)



Derive a closed formula for value of $M_1 = 48.37\dots$ (to at least 7 figures) having *exactly* periodic behavior. Simplest formula should relate to tangent of a desired Estrangian rotation half-angle $\theta/2$ for mass M_1 .

Pseudo-Vibrations

Exercise 4.2 On p.50-55 of *Lect. 5to6*, is shown pseudo-harmonic motion of the large mass $M=50kg$ attacked on either side by a pair of tiny masses $m=0.1kg$ each traveling back and forth in a range of $Y_0=3.5m$ at an average speed of $20m/sec$. The calculation seems to come up a period about $\sqrt{3}$ times too big for mass M . Explain what was overlooked and derive an improved formula for the period.