PHYSICS 331 Advanced Classical Mechanics
Problem Set 9

Problem 1
Thornton and Marion: Chapter 4, Problem 6.

Problem 2
Download the Mathematica notebook *duffing.nb* from our website. It simulates the Duffing oscillator. Consider the behaviour as you change the magnitude f of the forcing term. What does the behaviour look like for $f = 0.01$? Why? What happens when f increases? Try several values: $f = 0.1, 0.2, 0.4, 0.6, 0.7, 0.8$. Comment on your observations. In particular, if you notice some dramatic change in behaviour, you may want to zoom in on the transition. For example, if you see something between $f = 0.3$ and $f = 0.4$, then try $f = 0.35$. You'll need to keep zooming in to several decimal places to be in a position to capture the transition behaviour–be patient and keep increasing the precision until you have found at least one of the intermediate states. Print out a few representative plots.

Problem 3
Thornton and Marion: Chapter 4, Problem 25. You'll want to create a Mathematica notebook to do this. Begin by modifying the *duffing.nb* notebook from the previous task.

Problem 4
Thornton and Marion: Chapter 4, Problem 10. Use a Mathematica notebook to do this. Begin by modifying the *pendulum_dd.nb* notebook from our website.