PHYS 314
HOMEWORK #5

Due : 24 Feb 2017

1. A 10 kg mass suspended from the end of a vertical spring of negligible mass stretches the mass by 2 cm. Determine the position of the object at any time if it is initially pulled down by 1 cm and then released. Find also the amplitude, period and frequency of motion.

2. Suppose now the same mass is pulled down 3 cm (instead of 2 cm) and is given an initial velocity of 1 m/s downward. Find the motion at any time, amplitude, period and frequency (and assume the mass is suspended from the same spring as in problem 1).

3. A particle executing damped harmonic motion obeys the equation :

$$5\ddot{x} + 20\dot{x} + 8x = 0$$

If the particle starts from rest 1 m from the origin:

a) Find the position of the particle at any time, the amplitude and frequency of motion.

b) Find the logarithmic decrement.

c) Use Mathematica to plot the motion of this mass and also plot the phase diagram. Submit your Mathematica output with this homework assignment.

4. Text, problem 3 - 8.

5. Text, problem 3 - 12.