Computational Physics / PHYS-UA 210 / Problem Set #7
Due October 18, 2019

You *must* label all axes of all plots, including giving the *units*!!

1. Exercise 6.2 in Newman.

2. Consider Example 6.2 in Newman. We will alter this problem to handle a heterogeneous set of masses.

   (a) Rewrite Equation 6.56 with a heterogeneous set of masses m_i.

   (b) Alter the code in `springs.py` to use a heterogeneous set of masses. Test it for constant mass $m_i = 1$ and demonstrate that it gets the same results as the unaltered code.

   (c) Test putting a large mass near the middle, $m_{13} = 10$, with $m_i = 1$ otherwise.

   (d) Test putting a small mass near the middle $m_{13} = 0.1$.

3. We will further consider Example 6.2 in Newman, now altering it to account for dissipation.

   (a) Consider the case that there is a dissipative term on the RHS of Equation 6.50 with an amplitude $-\gamma\xi_i$. By considering the case that there is only one mass, convince yourself that the solution amplitudes x_i in this case have to be complex.

   (b) Alter the code in `springs.py` so that it uses the `inv` function in `numpy.linalg` instead of performing the inverse itself.

   (c) How does the imaginary component of x_i vary with position and γ?