Review: Begin Section 2/Exam 2:

1. Modules/Packages/Libraries
2. NumPy – a Python library for working with multidimensional arrays.
   1. array creation and manipulation – np.linspace, np.array
   2. array slicing
3. SciPy – a Python library for scientific computing.
   1. numerical integration with quad
   2. root finding with fsolve
4. Matplotlib – a Python library for plotting (similar to MATLAB).
   1. simple plotting of numpy arrays
   2. formatting plots – TeX (<https://matplotlib.org/stable/tutorials/text/mathtext.html> )
5. Numerical methods:
   1. Gaussian quadrature – integrate.quad
   2. Least Squares Curve Fitting
   3. Cubic spline

Continuing: Section 2/Exam 2:

1. scipy.linalg.eig – solve the eigenvalue problem:
2. scipy.optimize.fsolve – find roots of set of equations
3. scipy.integrate.solve\_ivp – solve systems of ordinary differential equations
   1. State variable dynamic models
   2. Solving ODE’s with Python

## Object oriented programming (OOP)

1. A class a general description of ‘something’ we want to model (e.g., a bolt)
2. An object a particular instance of a class.
3. classes contain: 1. a constructor, 2. properties, 3. methods
4. We can have many instances (objects) of a class in a program.
5. classes can inherit properties from parents.
6. classes can have objects of other classes as properties