The numpy package

- The Python programming language was not initially designed for numerical computing, but attracted the attention of the scientific/engineering community early on.
- NumPy is an extension to the Python programming language, adding support for large, multi-dimensional arrays and matrices, along with a large library of high-level mathematical functions to operate on these arrays.

- The ancestor of NumPy, Numeric, was originally created by Jim Hugunin with contributions from several other developers.
- In 2005, Travis Oliphant created NumPy by incorporating features of Numarray into Numeric with extensive modifications.

The numpy package

- NumPy is open source and has many contributors.
- **Website** http://www.numpy.org/

Useful Commands for simulation exercises

- `random.randint(a, b)` - Return a random integer N such that $a \leq N \leq b$.
- `random.choice(seq)` - return a random element from the non-empty sequence `seq`. If `seq` is empty, raises `IndexError`.
- `random.sample(population, k)` - Return a k length list of unique elements chosen from the population sequence. Used for random *sampling without replacement*.

Array Creation

```
>>> import numpy as np
>>> x = np.array([1, 2, 3])
>>> x
array([1, 2, 3])
>>> y = np.arange(10)  # like Python's range, but returns an arra
>>> y
array([0, 1, 2, 3, 4, 5, 6, 7, 8, 9])
```

Basic Operations

```
>>> a = np.array([1, 2, 3, 6])
>>> b = np.linspace(0, 2, 4)  # create an array with 4 equally spaced poir
>>> c = a - b
>>> c
array([ 1.        ,  1.33333333,  1.66666667,  4.        ])
>>> a**2
array([ 1,  4,  9, 36])
```