NumPy Operations

Arithmetic

You can easily perform array with array arithmetic, or scalar with array arithmetic. Let's see some examples:

In [1]:
```
import numpy as np
arr = np.arange(0,10)
```

In [2]:
```
arr + arr
```

Out[2]:
```
array([ 0,  2,  4,  6,  8, 10, 12, 14, 16, 18])
```

In [3]:
```
arr * arr
```

Out[3]:
```
array([ 0,  1,  4,  9, 16, 25, 36, 49, 64, 81])
```

In [4]:
```
arr - arr
```

Out[4]:
```
array([0, 0, 0, 0, 0, 0, 0, 0, 0, 0])
```

In [5]:
```
# Warning on division by zero, but not an error!
# Just replaced with nan
arr/arr
```

```
/Users/marci/anaconda/lib/python3.5/site-packages/ipykernel/__main__.py:1: Runt
imeWarning: invalid value encountered in true_divide
  if __name__ == '__main__':
```

Out[5]:
```
array([ nan,   1.,   1.,   1.,   1.,   1.,   1.,   1.,   1.,   1.])
```

In [6]:
```
# Also warning, but not an error instead infinity
1/arr
```

```
/Users/marci/anaconda/lib/python3.5/site-packages/ipykernel/__main__.py:1: Runt
imeWarning: divide by zero encountered in true_divide
  if __name__ == '__main__':
```

Out[6]:
```
array([        inf,  1.        ,  0.5       ,  0.33333333,  0.25      ,
        0.2       ,  0.16666667,  0.14285714,  0.125     ,  0.11111111])
```

In [10]:
```
arr**3
```

Out[10]:
```
array([  0,   1,   8,  27,  64, 125, 216, 343, 512, 729])
```

Universal Array Functions

Numpy comes with many [universal array functions (http://docs.scipy.org/doc/numpy/reference/ufuncs.html)](), which are essentially just mathematical operations you can use to perform the operation across the array. Let's show some common ones:

In [12]:
```
#Taking Square Roots
np.sqrt(arr)
```

Out[12]:
```
array([ 0.        ,  1.        ,  1.41421356,  1.73205081,  2.        ,
        2.23606798,  2.44948974,  2.64575131,  2.82842712,  3.        ])
```

In [13]:
```
#Calcualting exponential (e^)
np.exp(arr)
```

Out[13]:
```
array([  1.00000000e+00,   2.71828183e+00,   7.38905610e+00,
         2.00855369e+01,   5.45981500e+01,   1.48413159e+02,
         4.03428793e+02,   1.09663316e+03,   2.98095799e+03,
         8.10308393e+03])
```

In [14]:
```
np.max(arr) #same as arr.max()
```

Out[14]:
```
9
```

In [15]:
```
np.sin(arr)
```

Out[15]:
```
array([ 0.        ,  0.84147098,  0.90929743,  0.14112001, -0.7568025 ,
       -0.95892427, -0.2794155 ,  0.6569866 ,  0.98935825,  0.41211849])
```

In [16]:
```
np.log(arr)
```

```
/Users/marci/anaconda/lib/python3.5/site-packages/ipykernel/__main__.py:1: Runt
imeWarning: divide by zero encountered in log
  if __name__ == '__main__':
```

Out[16]:
```
array([       -inf,  0.        ,  0.69314718,  1.09861229,  1.38629436,
        1.60943791,  1.79175947,  1.94591015,  2.07944154,  2.19722458])
```