**NumPy Operations**[**¶**](#gjdgxs)

**Arithmetic**[**¶**](#30j0zll)

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: RuntimeWarning: 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: RuntimeWarning: 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**[**¶**](#1fob9te)

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]:

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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: RuntimeWarning: 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])

**Great Job!**[**¶**](#3znysh7)

That's all we need to know for now!