
MSML 605 - Lecture 5



More Numpy

Masked array

```
# Masked array
```

```
x = np.ma.array([1,2,3,4],mask=[0,1,0,1])
```

```
x
```

```
masked_array(data=[1, --, 3, --],  
             mask=[False,  True, False,  True],  
             fill_value=999999)
```

```
y = np.ma.array([1,2,3,4],mask=[0,1,1,1])
```

```
y
```

```
masked_array(data=[1, --, --, --],  
             mask=[False,  True,  True,  True],  
             fill_value=999999)
```

Masked array

```
x+y
```

```
masked_array(data=[2, --, --, --],  
             mask=[False, True, True, True],  
             fill_value=999999)
```

```
np.ma.sqrt([1,-1,2,-2])
```

```
masked_array(data=[1.0, --, 1.4142135623730951, --],  
            mask=[False, True, False, True],  
            fill_value=1e+20)
```

Masked array - Invalid array

```
x = np.array([1,2,3,-999,5])
```

```
mx = np.ma.masked_array(x, mask=[0,0,0,1,0])
```

```
mx
```

```
masked_array(data=[1, 2, 3, --, 5],
             mask=[False, False, False,  True, False],
             fill_value=999999)
```

```
mx.mean()
```

```
2.75
```

```
np.mean(mx)
```

```
2.75
```

Masked array - Invalid array

```
x = np.array([1,2,3,-999,5])
```

```
mx = np.ma.masked_array(x, mask=[0,0,0,1,0])
```

```
mx[1] = 9
```

```
x
```

```
array([ 1,  9,  3, -999,  5])
```

```
mx[1] = np.ma.masked
```

```
mx
```

```
masked_array(data=[1, --, 3, --, 5],
              mask=[False,  True, False,  True, False],
              fill_value=999999)
```

Masked array - Invalid array

```
mx[1] = np.ma.masked
```

```
mx
```

```
masked_array(data=[1, --, 3, --, 5],  
             mask=[False,  True, False,  True, False],  
             fill_value=999999)
```

```
mx[1] = 9
```

```
mx
```

```
masked_array(data=[1, 9, 3, --, 5],  
             mask=[False, False, False,  True, False],  
             fill_value=999999)
```

```
mx.mask
```

```
array([False, False, False,  True, False])
```

Masked array - Invalid array

```
x2 = mx.filled(-1)
```

```
x2
```

```
array([ 1,  9,  3, -1,  5])
```

```
mx.mask = np.ma.nomask
```

```
mx
```

```
masked_array(data=[1, 9, 3, -999, 5],  
             mask=[False, False, False, False, False],  
             fill_value=999999)
```


Polynomials

$$5x^3 + 2x^2 + 3x + 1$$

```
p = np.poly1d([5,2,3,1])
```

```
p
```

```
poly1d([5, 2, 3, 1])
```

```
p(0)
```

```
1
```

```
p(-1)
```

```
-5
```

```
p.roots
```

```
array([-0.02783323+0.76161505j, -0.02783323-0.76161505j,  
       -0.34433354+0.j          ])
```

```
p.order
```

```
3
```

Polynomials

$$5x^3 + 2x^2 + 3x + 1$$

```
p = np.polynomial.Polynomial([1,3,2,5])
```

```
p
```

```
x ↦ 1.0 + 3.0x + 2.0x2 + 5.0x3
```