

```
In [1]: import numpy as np
import matplotlib.pyplot as plt
%matplotlib inline
```

```
In [4]: points=np.arange(-5,5,0.01)
```

```
In [5]: dx,dy=np.meshgrid(points,points)
```

```
In [6]: dx
```

```
Out[6]: array([[ -5.   , -4.99, -4.98, ...,  4.97,  4.98,  4.99],
               [ -5.   , -4.99, -4.98, ...,  4.97,  4.98,  4.99],
               [ -5.   , -4.99, -4.98, ...,  4.97,  4.98,  4.99],
               ...,
               [ -5.   , -4.99, -4.98, ...,  4.97,  4.98,  4.99],
               [ -5.   , -4.99, -4.98, ...,  4.97,  4.98,  4.99],
               [ -5.   , -4.99, -4.98, ...,  4.97,  4.98,  4.99]])
```

```
In [7]: dy
```

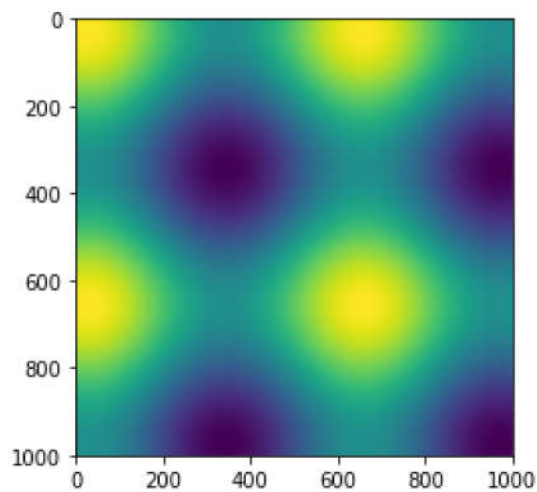
```
Out[7]: array([[ -5.   , -5.   , -5.   , ..., -5.   , -5.   , -5.   ],
               [-4.99, -4.99, -4.99, ..., -4.99, -4.99, -4.99],
               [-4.98, -4.98, -4.98, ..., -4.98, -4.98, -4.98],
               ...,
               [ 4.97,  4.97,  4.97, ...,  4.97,  4.97,  4.97],
               [ 4.98,  4.98,  4.98, ...,  4.98,  4.98,  4.98],
               [ 4.99,  4.99,  4.99, ...,  4.99,  4.99,  4.99]])
```

```
In [8]: z=(np.sin(dx)+np.sin(dy))
z
```

```
Out[8]: array([[ 1.91784855e+00,  1.92063718e+00,  1.92332964e+00, ...,
                -8.07710558e-03, -5.48108704e-03, -2.78862876e-03],
               [ 1.92063718e+00,  1.92342581e+00,  1.92611827e+00, ...,
                -5.28847682e-03, -2.69245827e-03, -5.85087534e-14],
               [ 1.92332964e+00,  1.92611827e+00,  1.92881072e+00, ...,
                -2.59601854e-03, -5.63993297e-14,  2.69245827e-03],
               ...,
               [-8.07710558e-03, -5.28847682e-03, -2.59601854e-03, ...,
                -1.93400276e+00, -1.93140674e+00, -1.92871428e+00],
               [-5.48108704e-03, -2.69245827e-03, -5.63993297e-14, ...,
                -1.93140674e+00, -1.92881072e+00, -1.92611827e+00],
               [-2.78862876e-03, -5.85087534e-14,  2.69245827e-03, ...,
                -1.92871428e+00, -1.92611827e+00, -1.92342581e+00]])
```

```
In [10]: plt.imshow(z)
```

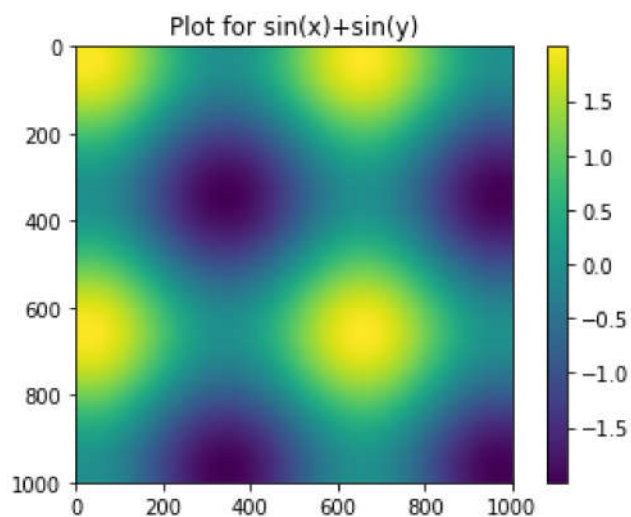
```
Out[10]: <matplotlib.image.AxesImage at 0xa3c2ef0>
```



```
In [11]: plt.imshow(z)
plt.colorbar()

plt.title('Plot for sin(x)+sin(y)')
```

```
Out[11]: Text(0.5,1,u'Plot for sin(x)+sin(y)')
```



```
In [24]: #numpy where
A=np.array([100,200,300,400])
B=np.array([1,2,3,4])
```

```
In [25]: condition=np.array([True,True,False,False])
```

```
In [26]: answer =[(A_val if cond else B_val) for A_val,B_val,cond in zip(A,B,condition)]
```

```
In [27]: answer
```

```
Out[27]: [100, 200, 3, 4]
```

```
In [28]: answer2=np.where(condition,A, B)
```

```
In [29]: answer2
```

```
Out[29]: array([100, 200, 3, 4])
```

```
In [30]: from numpy.random import randn
```

```
In [31]: arr=randn(5,5)  
arr
```

```
Out[31]: array([[ -0.23274626, -0.54816229, -1.05239253,  1.1926088 , -0.19997722],  
                [-1.08840536,  0.79827577,  0.90330825, -0.36177168, -0.52281707],  
                [-0.48446966, -1.25641515,  0.06320907,  0.05364312, -0.48211864],  
                [ 0.22418709,  2.11867175,  0.89355302,  1.71873928,  0.1929167 ],  
                [ 2.39380955,  0.51100857, -0.93652184, -0.50639321, -1.10541936]])
```

```
In [32]: np.where(arr<0,0,arr)
```

```
Out[32]: array([[0.          , 0.          , 0.          , 1.1926088 , 0.          ],  
                [0.          , 0.79827577, 0.90330825, 0.          , 0.          ],  
                [0.          , 0.          , 0.06320907, 0.05364312, 0.          ],  
                [0.22418709, 2.11867175, 0.89355302, 1.71873928, 0.1929167 ],  
                [2.39380955, 0.51100857, 0.          , 0.          , 0.          ]])
```

```
In [34]: arr=np.array([[1,2,3],[4,5,6],[7,8,9]])  
arr
```

```
Out[34]: array([[1, 2, 3],  
                [4, 5, 6],  
                [7, 8, 9]])
```

```
In [37]: arr.sum(0)
```

```
Out[37]: array([12, 15, 18])
```

```
arr.sum()
```

```
In [38]: arr.sum()
```

```
Out[38]: 45
```

```
In [39]: arr.mean()
```

```
Out[39]: 5.0
```

```
In [40]: arr.std()
```

```
Out[40]: 2.581988897471611
```

```
In [41]: arr.var()
```

```
Out[41]: 6.666666666666667
```

```
In [42]: bool_arr=np.array([True, False, True])
```

```
In [43]: bool_arr.any()
```

```
Out[43]: True
```

```
In [44]: bool_arr.all()
```

```
Out[44]: False
```

```
In [46]: #Sort  
arr=randn(5)  
arr
```

```
Out[46]: array([ 1.08263467,  1.18352778,  0.11322254, -1.15008114, -0.2991732 ])
```

```
In [48]: arr.sort()  
arr
```

```
Out[48]: array([-1.15008114, -0.2991732 ,  0.11322254,  1.08263467,  1.18352778])
```

```
In [49]: countries = np.array(['France', 'Germany', 'USA', 'Russia', 'USA', 'Mexico', 'Germany'])
```

```
In [50]: np.unique(countries)
```

```
Out[50]: array(['France', 'Germany', 'Mexico', 'Russia', 'USA'], dtype='<S7')
```

```
In [51]: np.in1d(['France', 'USA', 'Sweden'], countries)
```

```
Out[51]: array([ True,  True, False])
```

```
In [ ]:
```