In [1]:
```
import time
import sys
import numpy as np

import matplotlib.pyplot as plt
%matplotlib inline
```

In [2]:
```
# Plotting functions

def Plotvec1(u, z, v):

    ax = plt.axes()
    ax.arrow(0, 0, *u, head_width=0.05, color='r', head_length=0.1)
    plt.text(*(u + 0.1), 'u')

    ax.arrow(0, 0, *v, head_width=0.05, color='b', head_length=0.1)
    plt.text(*(v + 0.1), 'v')
    ax.arrow(0, 0, *z, head_width=0.05, head_length=0.1)
    plt.text(*(z + 0.1), 'z')
    plt.ylim(-2, 2)
    plt.xlim(-2, 2)

def Plotvec2(a,b):
    ax = plt.axes()
    ax.arrow(0, 0, *a, head_width=0.05, color ='r', head_length=0.1)
    plt.text(*(a + 0.1), 'a')
    ax.arrow(0, 0, *b, head_width=0.05, color ='b', head_length=0.1)
    plt.text(*(b + 0.1), 'b')
    plt.ylim(-2, 2)
    plt.xlim(-2, 2)
```

In [3]:
```
a = ["0", 1, "two", "3", 4]
```

In [4]:
```
print("a[0]:", a[0])
print("a[1]:", a[1])
```

```
print("a[2]:", a[2])
print("a[3]:", a[3])
print("a[4]:", a[4])
```

```
a[0]: 0
a[1]: 1
a[2]: two
a[3]: 3
a[4]: 4
```

In [5]:
```
# import numpy library

import numpy as np
```

In [6]:
```
# Create a numpy array

a = np.array([0, 1, 2, 3, 4])
a
```

Out[6]:
```
array([0, 1, 2, 3, 4])
```

In [7]:
```
# Print each element

print("a[0]:", a[0])
print("a[1]:", a[1])
print("a[2]:", a[2])
print("a[3]:", a[3])
print("a[4]:", a[4])
```

```
a[0]: 0
a[1]: 1
a[2]: 2
a[3]: 3
a[4]: 4
```

In [8]:
```
b = np.array([3.1, 11.02, 6.2, 213.2, 5.2])
```

In [9]:
```
type(b)
```

Out[9]:
```
numpy.ndarray
```

In [10]:
```
# Create numpy array

c = np.array([20, 1, 2, 3, 4])
c
```

Out[10]:
```
array([20,  1,  2,  3,  4])
```

In [11]:
```
# Assign the first element to 100

c[0] = 100
c
```

Out[11]:
```
array([100,   1,   2,   3,   4])
```

In [12]:
```
c[4] = 0
c
```

Out[12]:
```
array([100,   1,   2,   3,   0])
```

In [13]:
```
d = c[1:4]
d
```

Out[13]:
```
array([1, 2, 3])
```

In [14]:
```
c[3:5] = 300, 400
c
```

Out[14]:
```
array([100,   1,   2, 300, 400])
```

In [15]:
```
select = [0, 2, 3]
```

In [16]:
```
d = c[select]
d
```

Out[16]:
```
array([100,   2, 300])
```

In [17]:
```
c[select] = 100000
c
```

Out[17]:
```
array([100000,      1, 100000, 100000,    400])
```

In [18]:
```
a = np.array([0, 1, 2, 3, 4])
a
```

Out[18]:
```
array([0, 1, 2, 3, 4])
```

In [19]:
```
a.size
```

Out[19]:
```
5
```

In [20]:
```
a.shape
```

Out[20]:
```
(5,)
```

In [21]:
```
b = np.array([-1, 2, 3, 4, 5])
b
```

Out[21]:
```
array([-1,  2,  3,  4,  5])
```

In [22]:
```
max_b = b.max()
max_b
```

Out[22]:
```
5
```

In [23]:
```
min_b = b.min()
min_b
```

Out[23]:
```
-1
```

In [24]:
```
u = np.array([1, 0])
u
```

Out[24]:
```
array([1, 0])
```

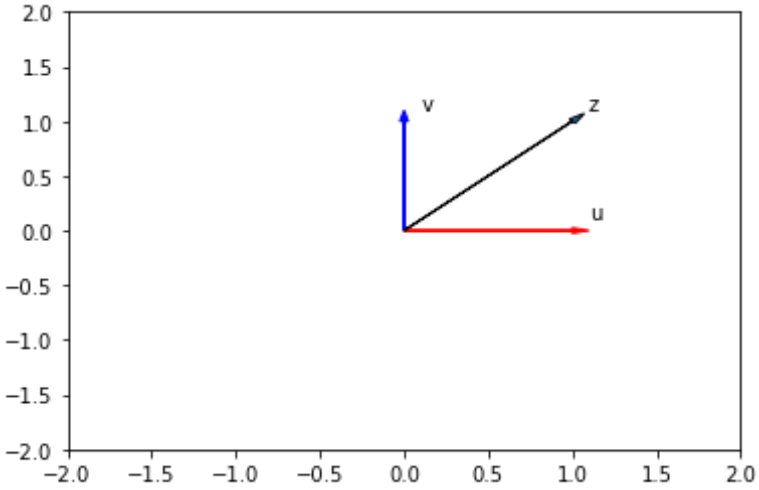
In [25]:
```
v = np.array([0, 1])
v
```

Out[25]:
```
array([0, 1])
```

In [26]:
```
z=u+v
z
```

Out[26]:
```
array([1, 1])
```

In [27]:
```
Plotvec1(u, z, v)
```



In [28]:
```
y = np.array([1, 2])
y
```

Out[28]:
```
array([1, 2])
```

In [29]:
```
z = 2 * y
z
```

Out[29]:
```
array([2, 4])
```

In [30]:
```
u = np.array([1, 2])
u
```

Out[30]:
```
array([1, 2])
```

In [31]:
```
v = np.array([3, 2])
v
```

Out[31]:
```
array([3, 2])
```

In [32]:
```
np.dot(u, v)
```

Out[32]:
```
7
```

In [33]:
```
u = np.array([1, 2, 3, -1])
u
```

Out[33]:
```
array([ 1,  2,  3, -1])
```

In [34]:
```
u + 1
```

Out[34]:
```
array([2, 3, 4, 0])
```

In [35]:
```
np.pi
```

Out[35]:
```
3.141592653589793
```

In [36]:
```
x = np.array([0, np.pi/2 , np.pi])
```

In [37]:
```
y = np.sin(x)
y
```

Out[37]:
```
array([0.0000000e+00, 1.0000000e+00, 1.2246468e-16])
```

In [38]:
```
np.linspace(-2, 2, num=5)
```

Out[38]:
```
array([-2., -1.,  0.,  1.,  2.])
```

In [39]:
```
np.linspace(-2, 2, num=9)
```

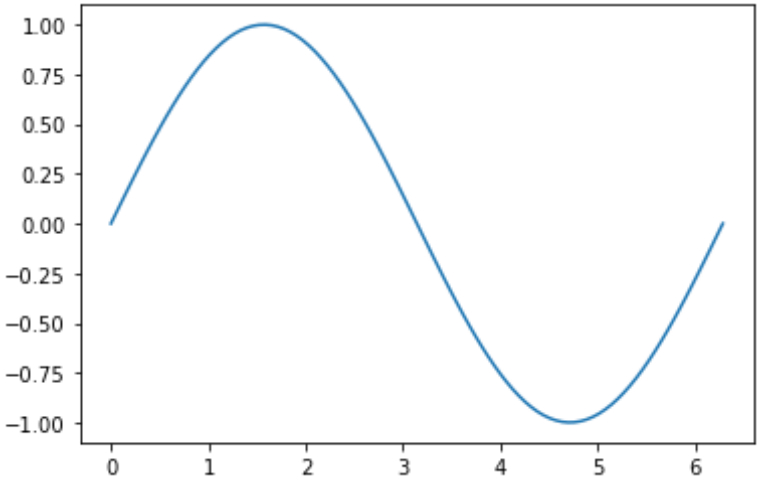
Out[39]:
```
array([-2. , -1.5, -1. , -0.5,  0. ,  0.5,  1. ,  1.5,  2. ])
```

In [40]:
```
x = np.linspace(0, 2*np.pi, num=100)
```

In [43]:
```
y = np.sin(x)
```

In [42]:
```
plt.plot(x, y)
```

Out[42]:
```
[<matplotlib.lines.Line2D at 0x7f40ed369e80>]
```



In [ ]:
```

```