In [1]:

```
import numpy as np
import matplotlib as mpl
import matplotlib.pyplot as plt
%matplotlib inline
```

In [2]:

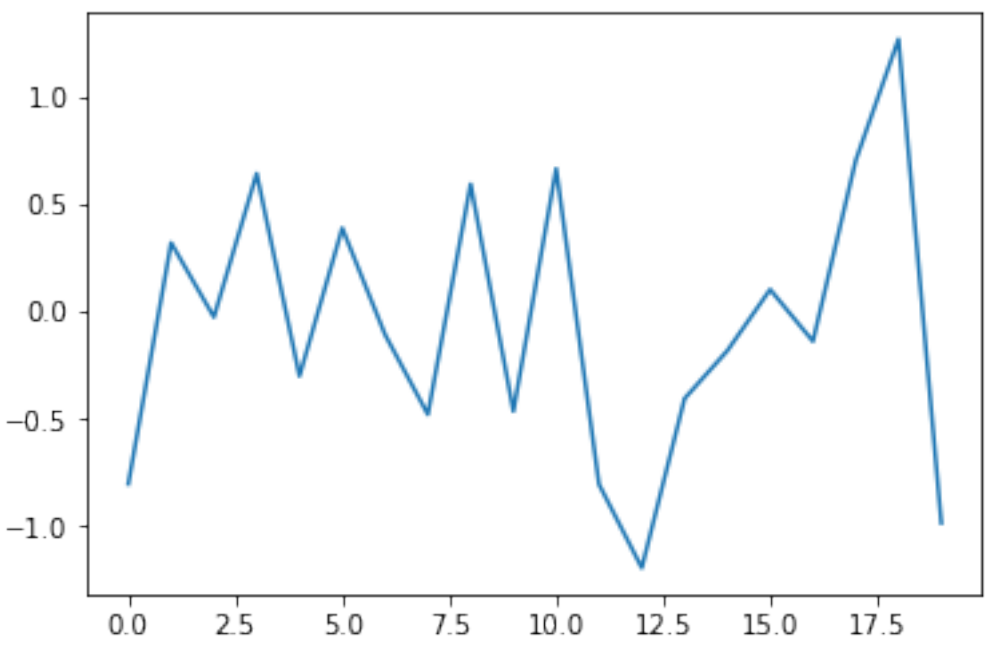
```
np.random.seed(1000)
y = np.random.standard_normal(20)
```

In [3]:

```
x = range(len(y))
plt.plot(x, y)
```

Out[3]:

```
[<matplotlib.lines.Line2D at 0x104c48b38>]
```

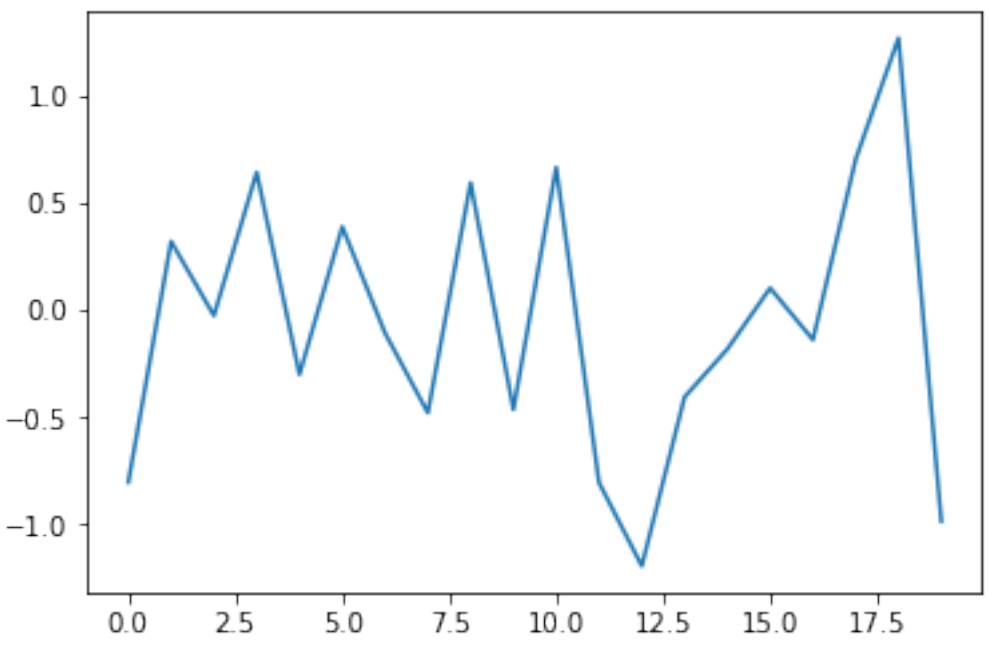


In [4]:

```
plt.plot(y)
```

Out[4]:

```
[<matplotlib.lines.Line2D at 0x104cd3c18>]
```

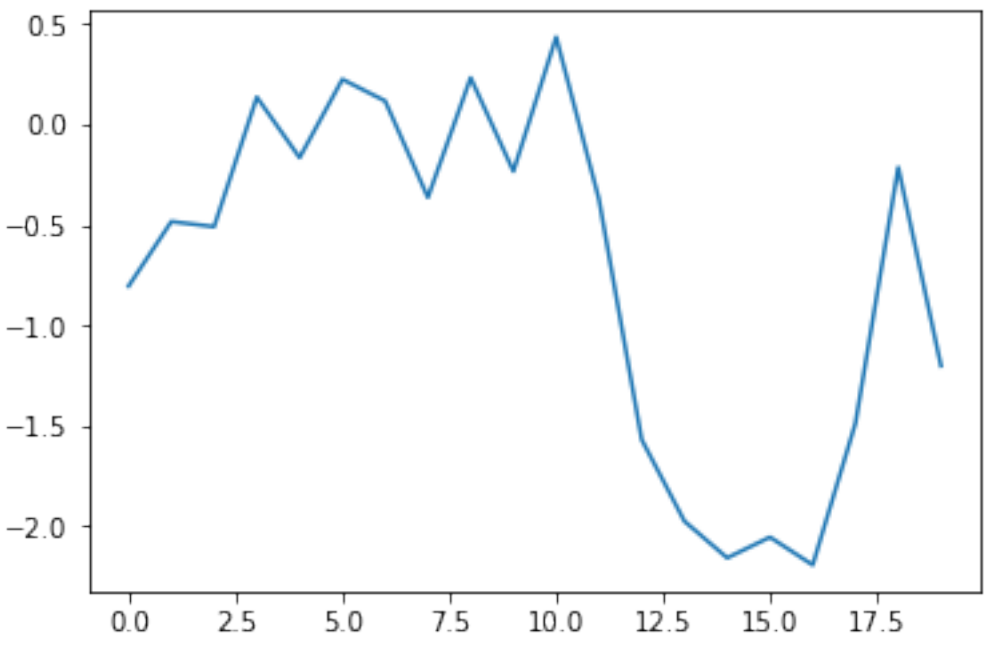


In [5]:

```
plt.plot(y.cumsum())
```

Out[5]:

```
[<matplotlib.lines.Line2D at 0x104d3af28>]
```

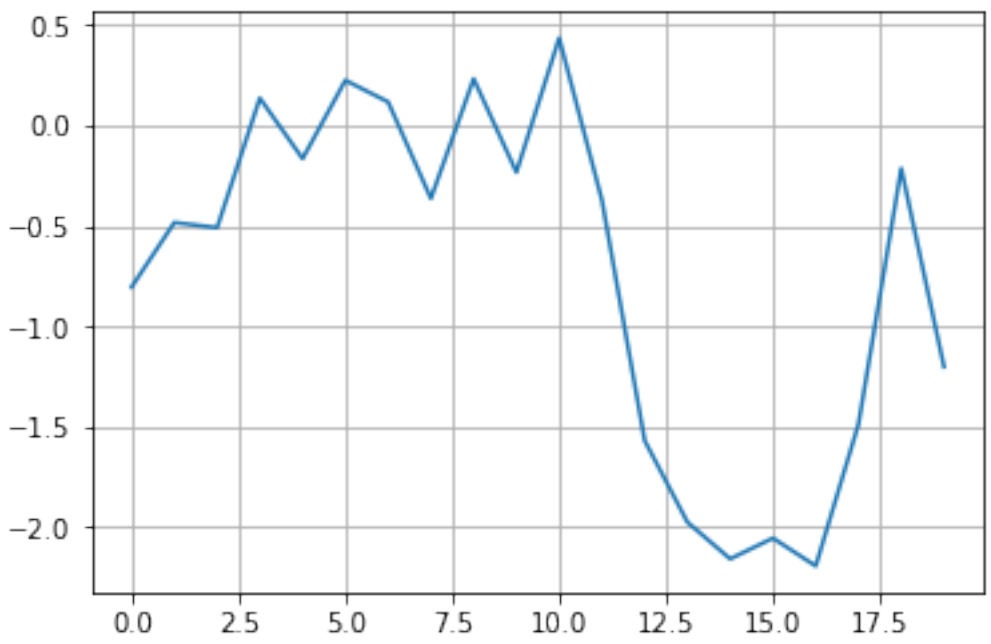


In [6]:

```
plt.plot(y.cumsum())
plt.grid(True)
plt.axis('tight')
```

Out[6]:

```
(-0.9500000000000001, 19.95, -2.322818663749045, 0.5655085808655865)
```

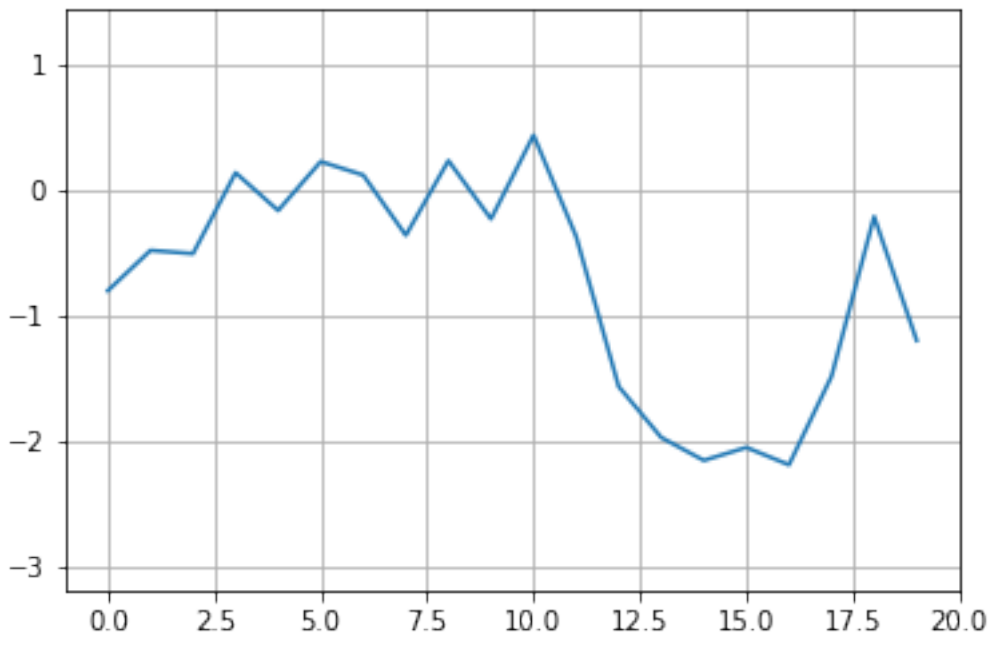


In [7]:

```
plt.plot(y.cumsum())
plt.grid(True)
plt.xlim(-1, 20)
plt.ylim(np.min(y.cumsum()) - 1, np.max(y.cumsum()) + 1)
```

Out[7]:

```
(-3.1915310617211072, 1.4342209788376488)
```

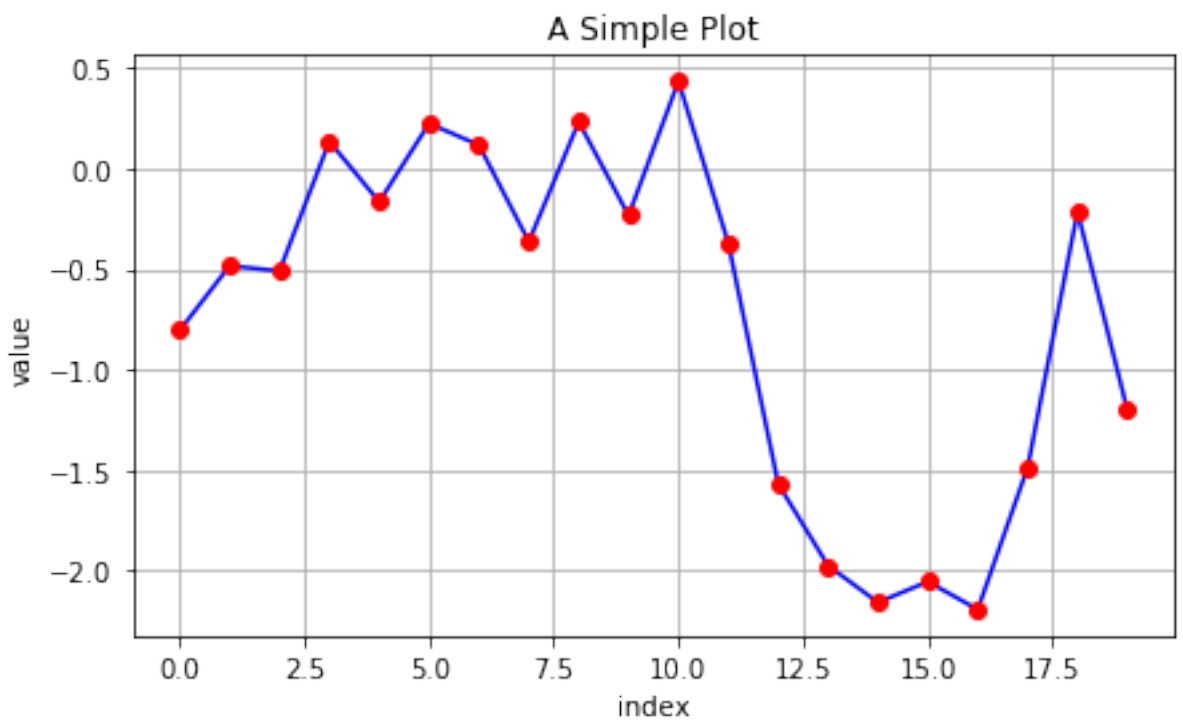


In [8]:

```
plt.figure(figsize=(7, 4))
plt.plot(y.cumsum(), 'b', lw=1.5)
plt.plot(y.cumsum(), 'ro')
plt.grid(True)
plt.axis('tight')
plt.xlabel('index')
plt.ylabel('value')
plt.title('A Simple Plot')
```

Out[8]:

```
Text(0.5,1,'A Simple Plot')
```



In [9]:

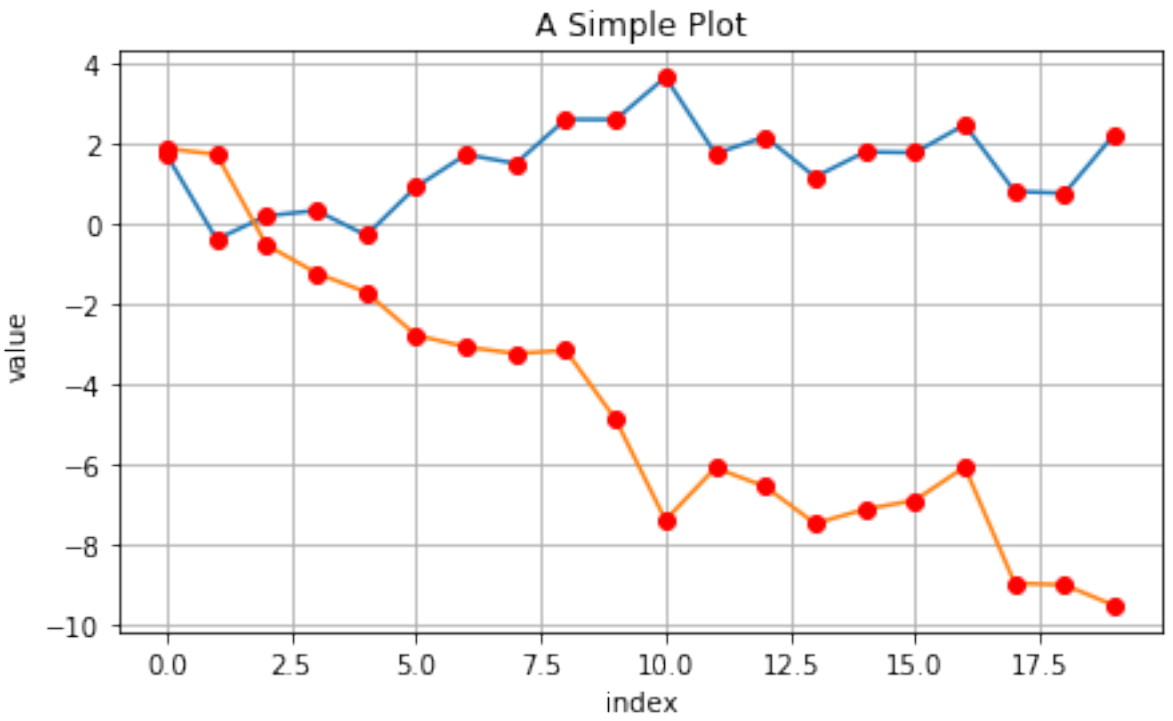
```
np.random.seed(2000)
y = np.random.standard_normal((20, 2)).cumsum(axis=0)
```

In [10]:

```
plt.figure(figsize=(7, 4))
plt.plot(y, lw=1.5)
plt.plot(y, 'ro')
plt.grid(True)
plt.axis('tight')
plt.xlabel('index')
plt.ylabel('value')
plt.title('A Simple Plot')
```

Out[10]:

```
Text(0.5,1,'A Simple Plot')
```

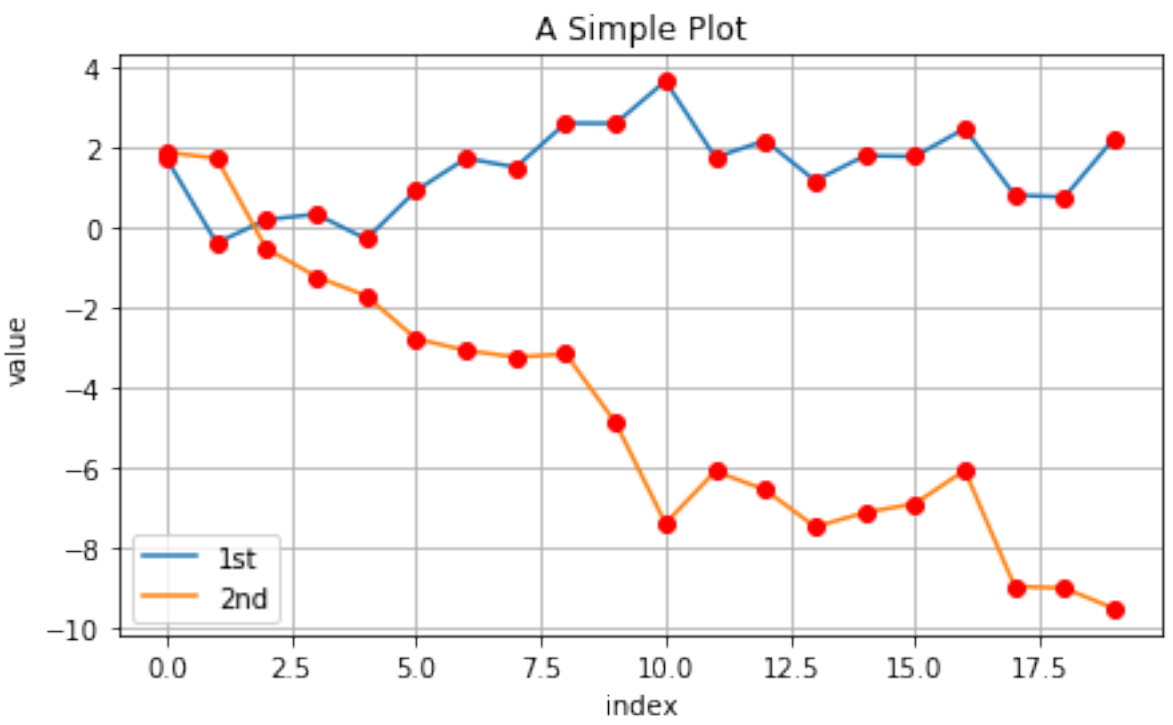


In [11]:

```
plt.figure(figsize=(7, 4))
plt.plot(y[:, 0], lw=1.5, label='1st')
plt.plot(y[:, 1], lw=1.5, label='2nd')
plt.plot(y, 'ro')
plt.grid(True)
plt.legend(loc=0)
plt.axis('tight')
plt.xlabel('index')
plt.ylabel('value')
plt.title('A Simple Plot')
```

Out[11]:

```
Text(0.5,1,'A Simple Plot')
```



In [12]:

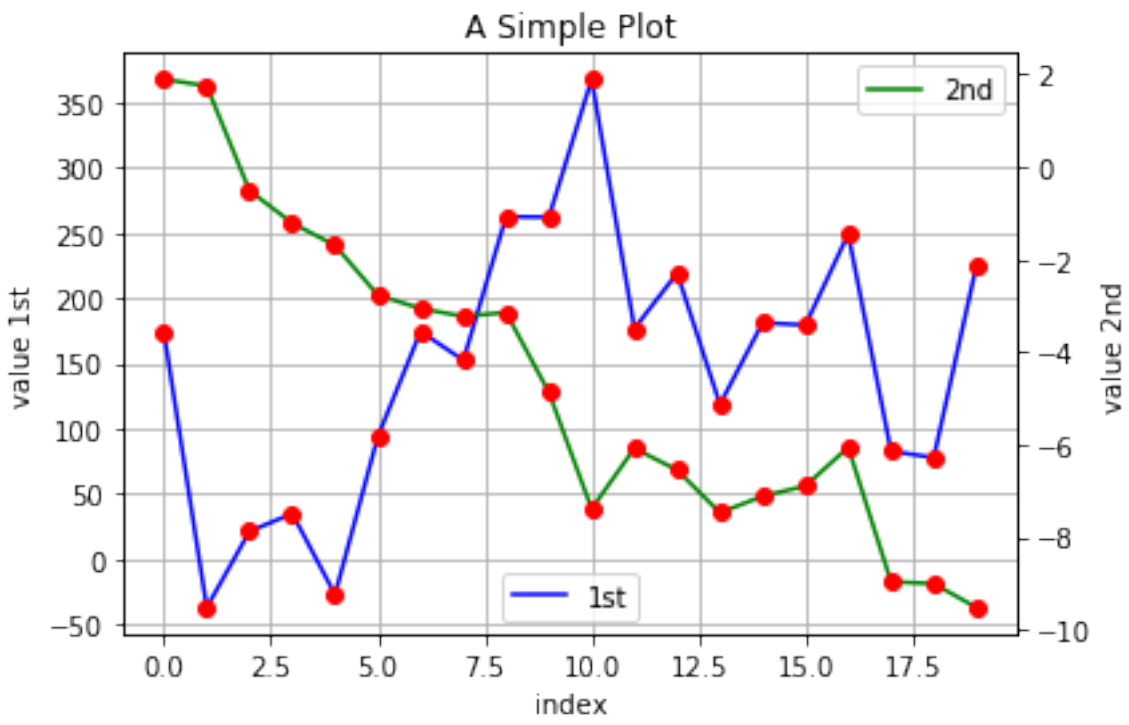
```
y[:, 0] = y[:, 0] * 100
```

In [13]:

```
fig, ax1 = plt.subplots()
plt.plot(y[:, 0], 'b', lw=1.5, label='1st')
plt.plot(y[:, 0], 'ro')
plt.grid(True)
plt.legend(loc=8)
plt.axis('tight')
plt.xlabel('index')
plt.ylabel('value 1st')
plt.title('A Simple Plot')
ax2 = ax1.twinx()
plt.plot(y[:, 1], 'g', lw=1.5, label='2nd')
plt.plot(y[:, 1], 'ro')
plt.legend(loc=0)
plt.ylabel('value 2nd')
```

Out[13]:

```
Text(0,0.5,'value 2nd')
```

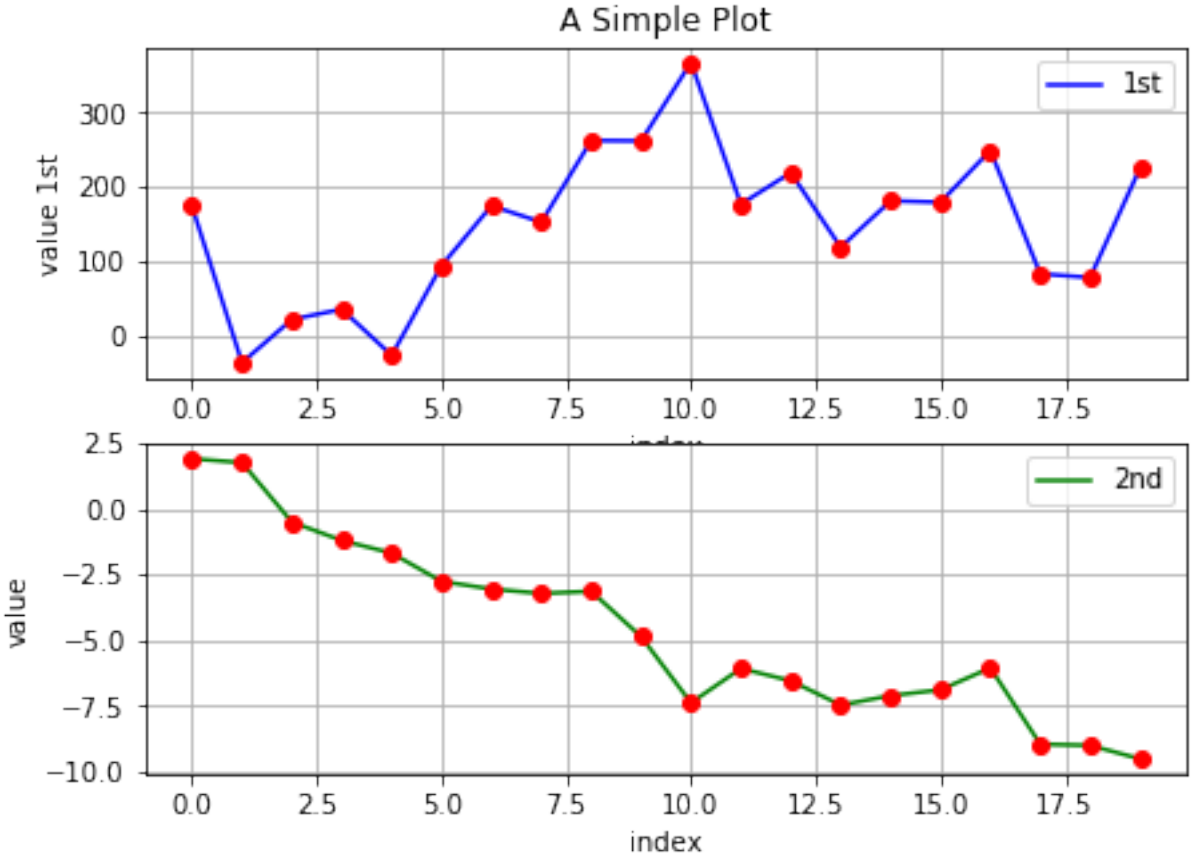


In [14]:

```
plt.figure(figsize=(7, 5))

plt.subplot(211)
plt.plot(y[:, 0], 'b', lw=1.5, label='1st')
plt.plot(y[:, 0], 'ro')
plt.grid(True)
plt.legend(loc=0)
plt.axis('tight')
plt.xlabel('index')
plt.ylabel('value 1st')
plt.title('A Simple Plot')

plt.subplot(212)
plt.plot(y[:, 1], 'g', lw=1.5, label='2nd')
plt.plot(y[:, 1], 'ro')
plt.grid(True)
plt.legend(loc=0)
plt.axis('tight')
plt.xlabel('index')
plt.ylabel('value')
```

Out[14]:

```
Text(0,0.5,'value')
```

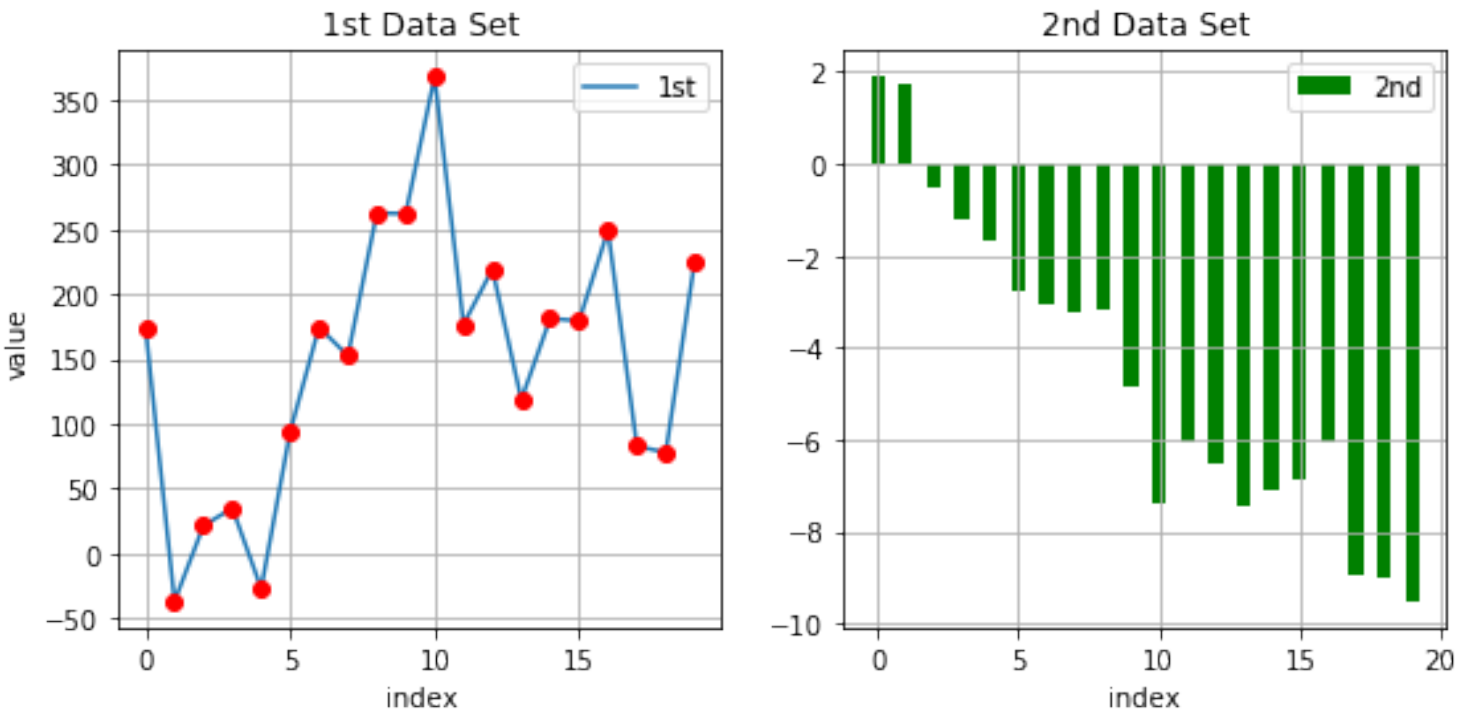


In [15]:

```
plt.figure(figsize=(9, 4))

plt.subplot(121)
plt.plot(y[:, 0], lw=1.5, label='1st')
plt.plot(y[:, 0], 'ro')
plt.grid(True)
plt.legend(loc=0)
plt.axis('tight')
plt.xlabel('index')
plt.ylabel('value')
plt.title('1st Data Set')

plt.subplot(122)
plt.bar(np.arange(len(y)), y[:, 1], width=0.5, color='g', label='2nd')
plt.grid(True)
plt.legend(loc=0)
plt.axis('tight')
plt.xlabel('index')
plt.title('2nd Data Set')
```

Out[15]:

```
Text(0.5,1,'2nd Data Set')
```



In [16]:

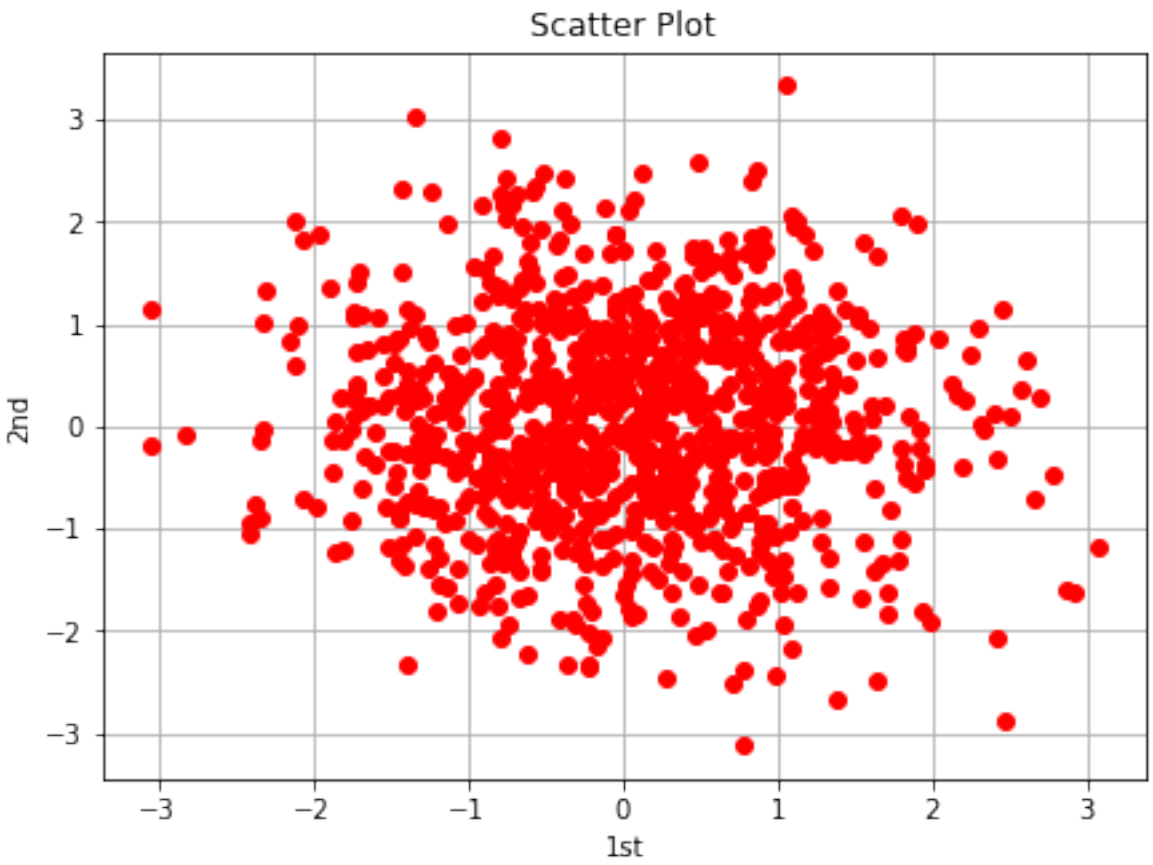
```
y = np.random.standard_normal((1000, 2))
```

In [17]:

```
plt.figure(figsize=(7, 5))
plt.plot(y[:, 0], y[:, 1], 'ro')
plt.grid(True)
plt.xlabel('1st')
plt.ylabel('2nd')
plt.title('Scatter Plot')
```

Out[17]:

```
Text(0.5,1,'Scatter Plot')
```

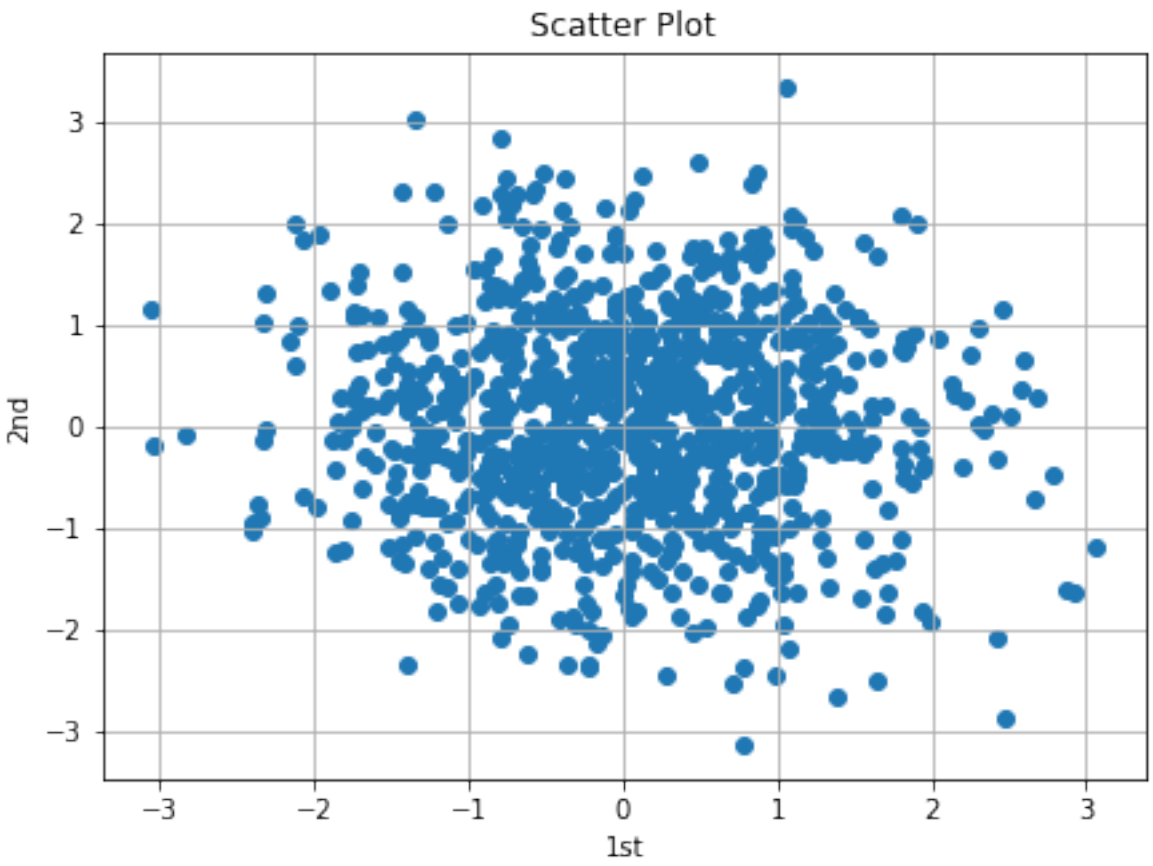


In [18]:

```
plt.figure(figsize=(7, 5))
plt.scatter(y[:, 0], y[:, 1], marker='o')
plt.grid(True)
plt.xlabel('1st')
plt.ylabel('2nd')
plt.title('Scatter Plot')
```

Out[18]:

```
Text(0.5,1,'Scatter Plot')
```



In [19]:

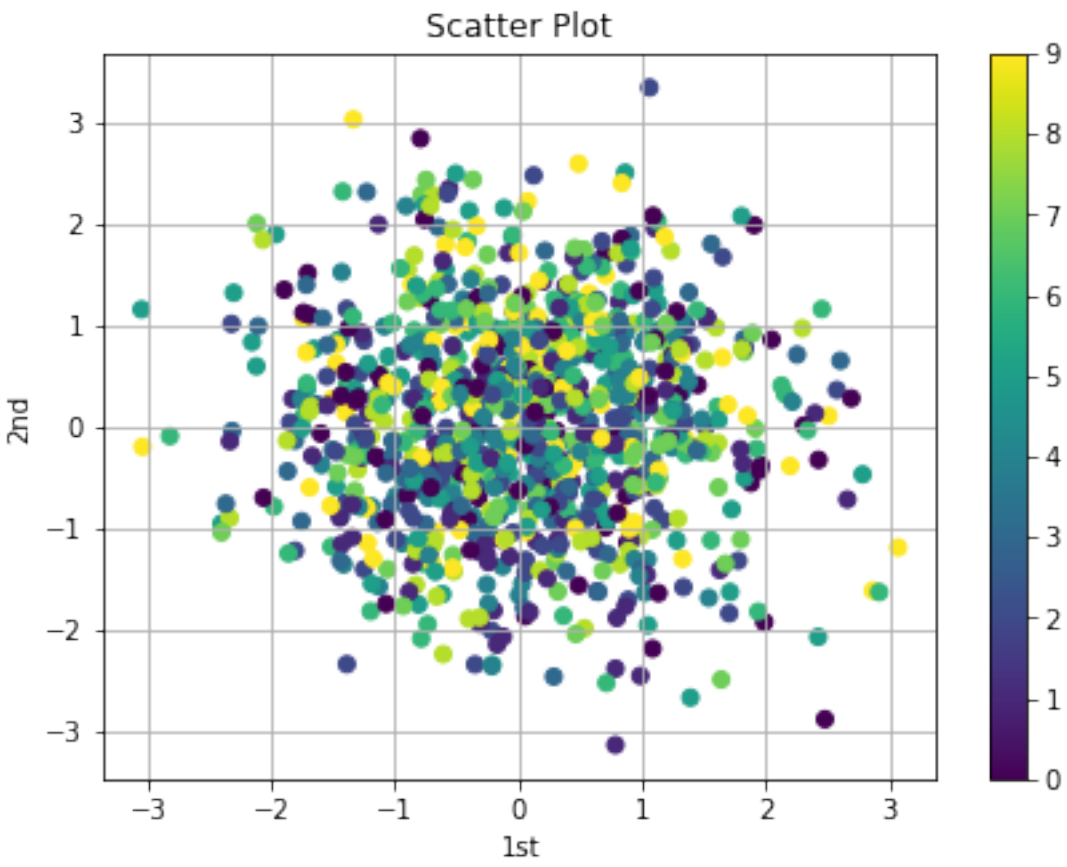
```
c = np.random.randint(0, 10, len(y))
```

In [20]:

```
plt.figure(figsize=(7, 5))
plt.scatter(y[:, 0], y[:, 1], c=c, marker='o')
plt.colorbar()
plt.grid(True)
plt.xlabel('1st')
plt.ylabel('2nd')
plt.title('Scatter Plot')
```

Out[20]:

```
Text(0.5,1,'Scatter Plot')
```

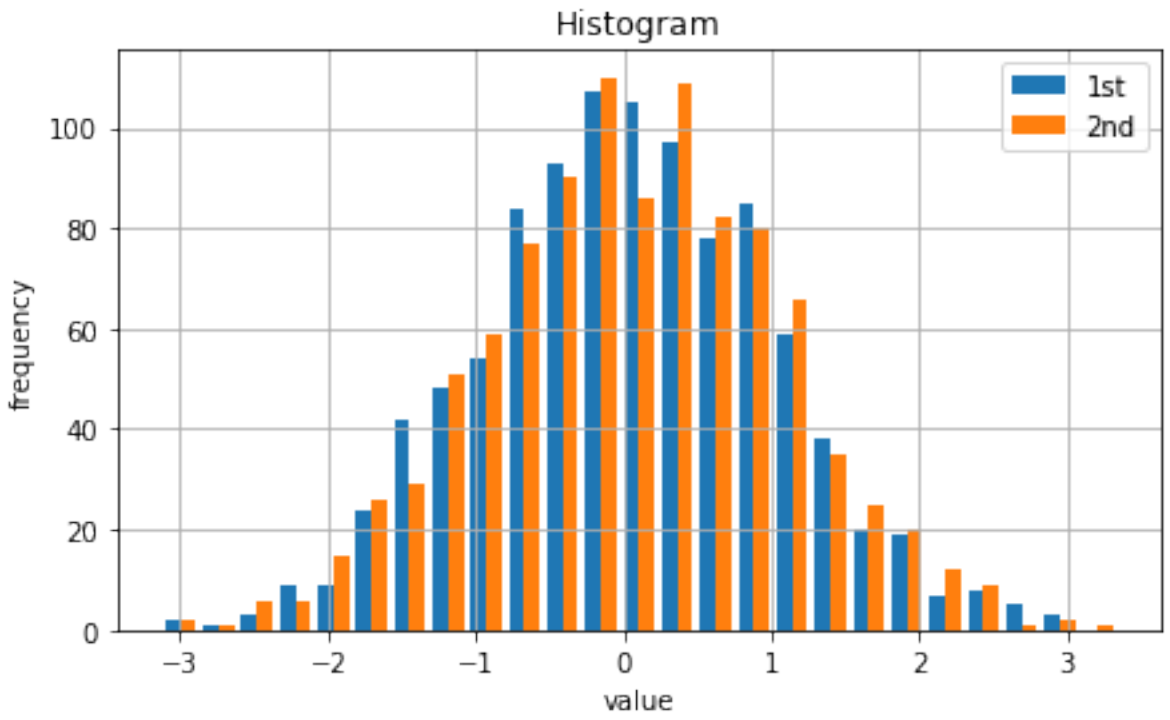


In [21]:

```
plt.figure(figsize=(7, 4))
plt.hist(y, label=['1st', '2nd'], bins=25)
plt.grid(True)
plt.legend(loc=0)
plt.xlabel('value')
plt.ylabel('frequency')
plt.title('Histogram')
```

Out[21]:

```
Text(0.5,1,'Histogram')
```

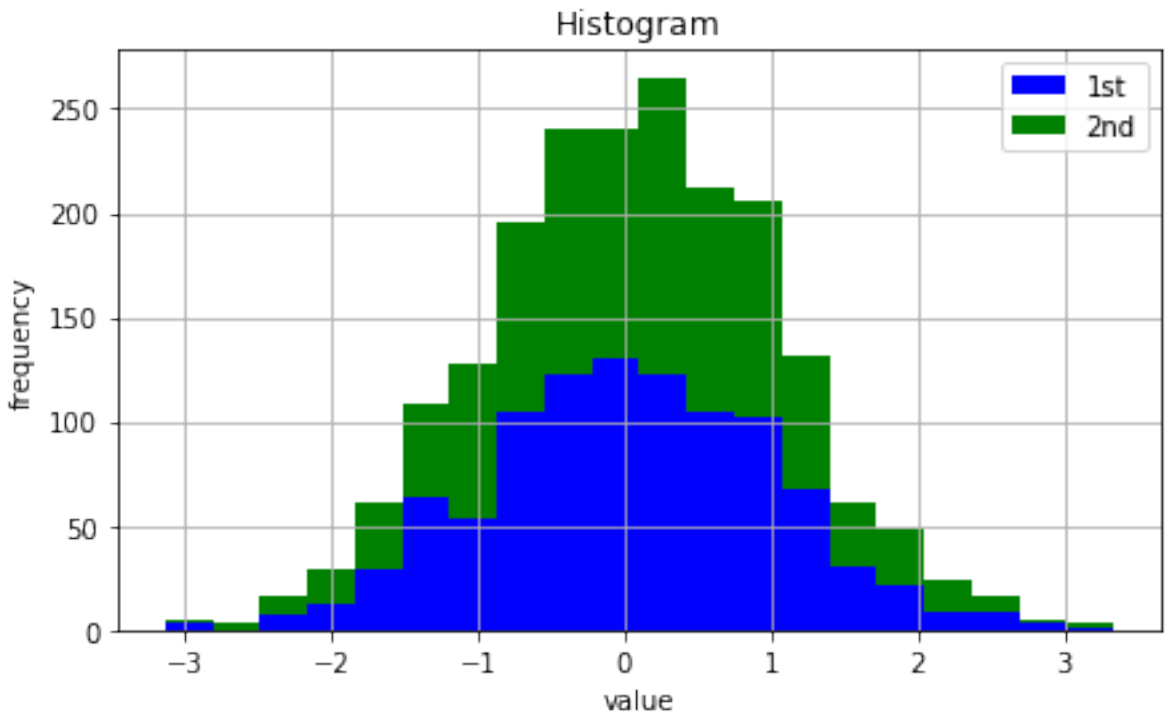


In [22]:

```
plt.figure(figsize=(7, 4))
plt.hist(y, label=['1st', '2nd'], color=['b', 'g'], stacked=True, bins=20)
plt.grid(True)
plt.legend(loc=0)
plt.xlabel('value')
plt.ylabel('frequency')
plt.title('Histogram')
```

Out[22]:

```
Text(0.5,1,'Histogram')
```

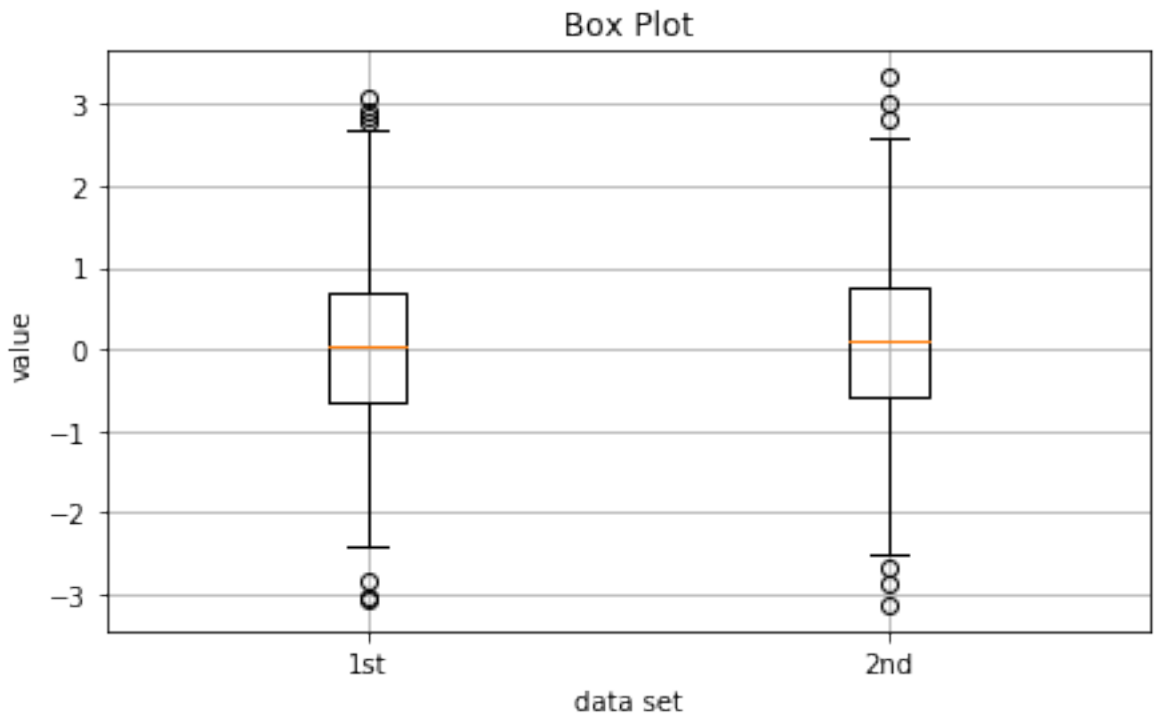


In [23]:

```
fig, ax = plt.subplots(figsize=(7, 4))
plt.boxplot(y)
plt.grid(True)
plt.setp(ax, xticklabels=['1st', '2nd'])
plt.xlabel('data set')
plt.ylabel('value')
plt.title('Box Plot')
```

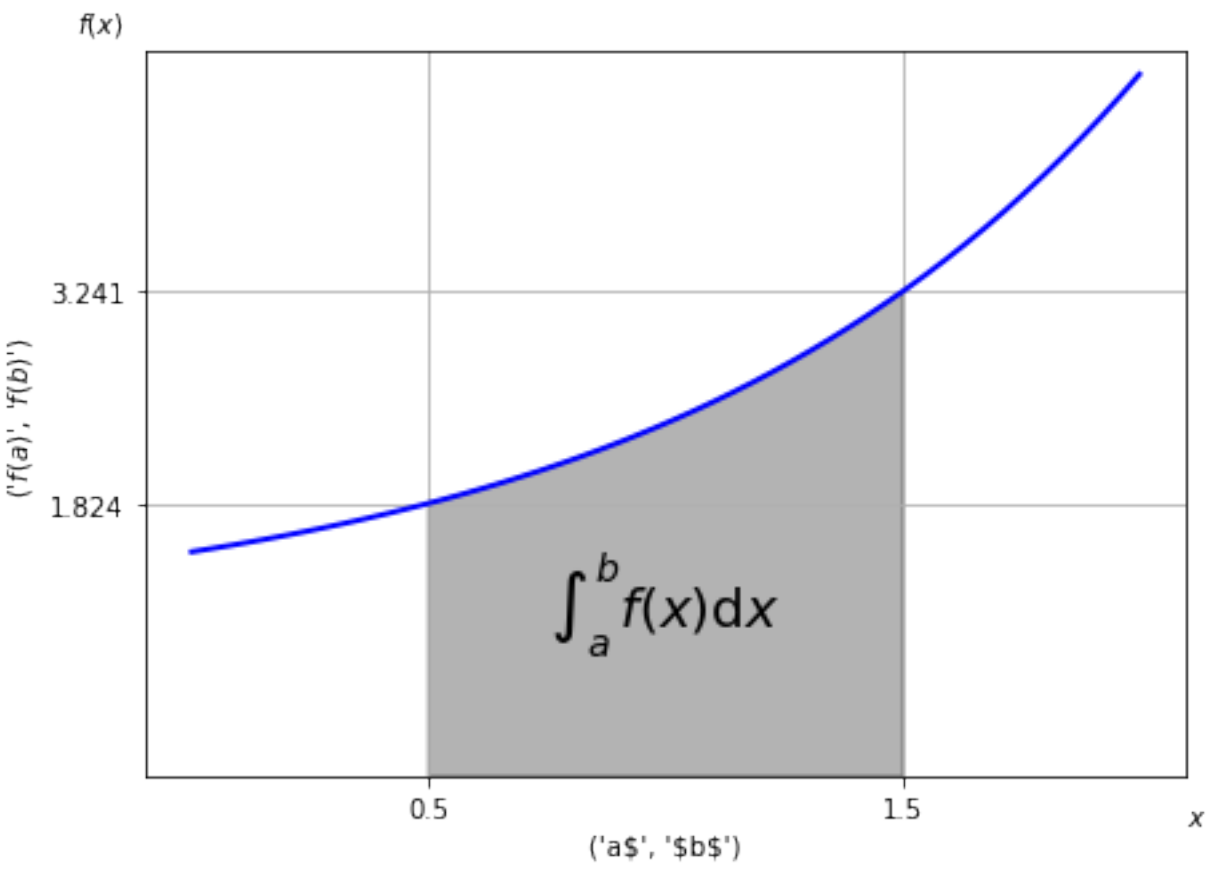
Out[23]:

```
Text(0.5,1,'Box Plot')
```



In [24]:

```
from matplotlib.patches import Polygon

def func(x):
    return np.exp(x) / 2 + 1


a = 0.5; b = 1.5
x = np.linspace(0, 2)
y = func(x)

fig, ax = plt.subplots(figsize=(7, 5))
plt.plot(x, y, 'b', lw=2)
plt.ylim(ymin=0)

Ix = np.linspace(a, b)
Iy = func(Ix)
verts = [(a, 0)] + list(zip(Ix, Iy)) + [(b, 0)]
poly = Polygon(verts, facecolor='0.7', edgecolor='0.5')
ax.add_patch(poly)

plt.text(0.5 * (a + b), 1, r"$\int_a^b f(x)\mathrm{d}x$", horizontalalignment=
'center',fontsize=20)

plt.figtext(0.9, 0.075, '$x$')
plt.figtext(0.075, 0.9, '$f(x)$')

ax.set_xticks((a, b))
ax.set_xlabel(('a$', '$b$'))
ax.set_yticks((func(a), func(b)))
ax.set_ylabel(('$f(a)$', '$f(b)$'))
plt.grid(True)
```



In [ ]: