In [1]:

```
import numpy as np
import pandas as pd
```

In [3]:

```
pip install scipy
```

```
Requirement already satisfied: scipy in c:\users\yasoda\appdata\local\prog
rams\python\python310\lib\site-packages (1.10.1)Note: you may need to rest
art the kernel to use updated packages.

Requirement already satisfied: numpy<1.27.0,>=1.19.5 in c:\users\yasoda\ap
pdata\local\programs\python\python310\lib\site-packages (from scipy) (1.2
4.3)

WARNING: You are using pip version 22.0.4; however, version 23.1.2 is avai
lable.
You should consider upgrading via the 'C:\Users\yasoda\AppData\Local\Progr
ams\Python\Python310\python.exe -m pip install --upgrade pip' command.
```

In [4]:

```
import scipy as sc
```

In [5]:

```
from numpy.random import randn
from numpy.random import seed
from numpy import cov
#seed random number generator
seed(1)
#prepare data
data1=20*randn(1000)+100
data2=data1+(10*randn(1000)+50)
#calculate covariance matrix
covariance=cov(data1,data2)
print(covariance)
```

```
[[385.33297729 389.7545618 ]
 [389.7545618  500.38006058]]
```

In [8]:

```
from numpy.random import randn
from numpy.random import seed
from scipy.stats import pearsonr
seed(1)
data1=20*randn(1000)+100
data2=data1+(10*randn(1000)+50)
corr,_=pearsonr(data1,data2)
print('pearsons correlation:%.3f'%corr)
```

```
pearsons correlation:0.888
```

In [10]:

```
from numpy.random import randn
from numpy.random import seed
from scipy.stats import spearmanr
seed(1)
data1=20*randn(1000)+100
data2=data1+(10*randn(1000)+50)
corr,_=spearmanr(data1,data2)
print('spearmans correlation:%.3f'%corr)
```

```
spearmans correlation:0.872
```

In [15]:

```
from scipy.stats import ttest_1samp
import numpy as np
ages=[45,50,23,46,60,45,24,34,67]
print(ages)
```

```
[45, 50, 23, 46, 60, 45, 24, 34, 67]
```

In [19]:

```
mean=np.mean(ages)
print(mean)
t_test,p_val=ttest_1samp(ages,30)
print("p_value is:",p_val)
```

```
43.77777777777778
p_value is: 0.023897611988610006
```

In [23]:

```
if p_val<0.05:
    print("we can reject the num hypothesis")
else:
    print("we can accept the null hypothesis")
```

```
we can reject the num hypothesis
```

In [24]:

```
pip install statsmodels
```

```
Collecting statsmodels
  Downloading statsmodels-0.14.0-cp310-cp310-win_amd64.whl (9.2 MB)
     ---------------------------------------- 9.2/9.2 MB 5.6 MB/s eta 0:0
0:00
Requirement already satisfied: pandas>=1.0 in c:\users\yasoda\appdata\loca
l\programs\python\python310\lib\site-packages (from statsmodels) (2.0.1)
Collecting patsy>=0.5.2
  Downloading patsy-0.5.3-py2.py3-none-any.whl (233 kB)
     ---------------------------------------- 233.8/233.8 KB 4.8 MB/s eta 0:
00:00
Requirement already satisfied: numpy>=1.18 in c:\users\yasoda\appdata\loca
l\programs\python\python310\lib\site-packages (from statsmodels) (1.24.3)
Requirement already satisfied: packaging>=21.3 in c:\users\yasoda\appdata
\local\programs\python\python310\lib\site-packages (from statsmodels) (23.
1)
Requirement already satisfied: scipy!=1.9.2,>=1.4 in c:\users\yasoda\appda
ta\local\programs\python\python310\lib\site-packages (from statsmodels)
(1.10.1)
Requirement already satisfied: pytz>=2020.1 in c:\users\yasoda\appdata\loc
al\programs\python\python310\lib\site-packages (from pandas>=1.0->statsmod
els) (2023.3)
Requirement already satisfied: python-dateutil>=2.8.2 in c:\users\yasoda\a
ppdata\local\programs\python\python310\lib\site-packages (from pandas>=1.0
->statsmodels) (2.8.2)
Requirement already satisfied: tzdata>=2022.1 in c:\users\yasoda\appdata\l
ocal\programs\python\python310\lib\site-packages (from pandas>=1.0->statsm
odels) (2023.3)
Requirement already satisfied: six in c:\users\yasoda\appdata\local\progra
ms\python\python310\lib\site-packages (from patsy>=0.5.2->statsmodels) (1.
16.0)
Installing collected packages: patsy, statsmodels
Successfully installed patsy-0.5.3 statsmodels-0.14.0
Note: you may need to restart the kernel to use updated packages.

WARNING: You are using pip version 22.0.4; however, version 23.1.2 is avai
lable.
You should consider upgrading via the 'C:\Users\yasoda\AppData\Local\Progr
ams\Python\Python310\python.exe -m pip install --upgrade pip' command.
```

In [29]:

```
import statsmodels as sm
from scipy import stats
from statsmodels.stats import weightstats as stests
```

In [3]:

```
data=[89,93,95,93,98,96,99,93,97,110,104,140,119,104,110,112,115,114]
z_test,p_val=stats.ztest(data,x2=None,value=100)
print(p_val)
```

```
---------------------------------------------------------------------------
-
NameError                                 Traceback (most recent call las
t)
Cell In[3], line 2
      1 data=[89,93,95,93,98,96,99,93,97,110,104,140,119,104,110,112,115,1
14]
----> 2 z_test,p_val=stats.ztest(data,x2=None,value=100)
      3 print(p_val)

NameError: name 'stats' is not defined
```

In [ ]:

```

```