In [2]:
```
import pandas as pd
import numpy  as np
from scipy import stats
```

Example: Gym Membership Program A gym plans to launch a membership program if it results in an average workout duration of more than 90 minutes per week per member. A random sample of 120 gym members enrolled in the pilot program exercised for an average of 95 minutes per week, with a standard deviation of 25 minutes. Should the membership program be launched?

In [3]:
```
t=(95-90)/(25/np.sqrt(120))
```

In [4]:
```
t
```

Out[4]:
```
2.1908902300206643
```

In [8]:
```
1-  stats.t.cdf(2.19,119)
```

Out[8]:
```
0.015237265892787955
```

In [ ]:
```

```

Example: Process Control in a Delivery Service Performance of a delivery service is monitored by the average delivery time. Data from 12 months shows that on the days when the process runs normally: μ=30 minutes, σ=10 minutes Due to limited resources, they cannot monitor every delivery; so, they randomly sample 40 deliveries per day.

In [9]:
```
t=(26-30)/(10/np.sqrt(40))
```

In [10]:
```
t
```

Out[10]:
```
-2.5298221281347035
```

In [12]:
```
  stats.t.cdf(-2.5298221281347035,39)
```

Out[12]:
```
0.0077816812266594355
```

In [ ]:
```

```

1-Sample T-Test

In [6]:
```
data=pd.Series([0.593,0.142,0.329,0.691,0.793,0.519,0.329,0.418,0.231])
```

In [7]:
```
data
```

Out[7]:
```
0    0.593
1    0.142
2    0.329
3    0.691
4    0.793
5    0.519
6    0.329
7    0.418
8    0.231
dtype: float64
```

In [8]:
```
data.describe()
```

Out[8]:
```
count    9.000000
mean     0.449444
std      0.216237
min      0.142000
25%      0.329000
50%      0.418000
75%      0.593000
max      0.793000
dtype: float64
```

In [9]:
```
stats.ttest_1samp(data,0.3)
```

Out[9]:
```
TtestResult(statistic=2.0733404242792908, pvalue=0.07185510949115519, df=8)
```

In [11]:
```
p=stats.ttest_1samp(data,0.3)[1]
```

In [12]:
```
p
```

Out[12]:
```
0.07185510949115519
```

In [13]:
```
p/2
```

Out[13]:
```
0.03592755474557759
```

In [ ]:
```

```

2-Sample T-Test

In [14]:
```
control=pd.Series([91,87,99,77,88,91])
trate=pd.Series([101,110,103,93,99,104])
```

In [15]:
```
stats.ttest_ind(control,trate)
```

Out[15]:
```
TtestResult(statistic=-3.4456126735364876, pvalue=0.006272124350809803, df=10.
0)
```

In [ ]:
```

```