Importing Libraries

In [2]:
```
import numpy as np
import pandas as pd
import seaborn as sns
import matplotlib.pyplot as plt
```

In [49]:
```
from scipy.stats import f,f_oneway,kruskal,ttest_ind,levene,shapiro,kstest,norm
from statsmodels.distributions.empirical_distribution import ECDF
from statsmodels.graphics.gofplots import qqplot
```

If Ttest Fails What to do?

We will perform a KS Test

In [4]:
```
df = pd.read_csv("Sachin_ODI.csv")
```

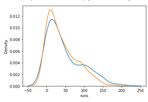
In [5]:
```
df.groupby(["Inns"])["runs"].mean()
```

Out[5]:
```
Inns
1    46.679588
2    40.175664
Name: runs, dtype: float64
```

In [6]:
```
df_first_innings = df.df["Inns"]==1]
df_second_innings = df.df["Inns"]==2]
```

In [7]:
```
sns.kdeplot(df_first_innings["runs"])
sns.kdeplot(df_second_innings["runs"])
```

Out[7]:
```
<AxesSubplot:xlabel='runs', ylabel='Density'>
```



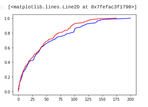
In [8]:
```
# Ho : Scoring patterns in both innings are same
# Ha : Scoring patterns are different

ttest_ind(df_first_innings["runs"],df_second_innings["runs"])

# Fail to Reject Ho
```

Out[8]:
```
Ttest_indResult(statistic=1.4612916295533178, pvalue=0.1448372419475996)
```

In [10]:
```
e1 = ECDF(df_first_innings["runs"])
e2 = ECDF(df_second_innings["runs"])
```

In [11]:
```
plt.plot(e1.x, e1.y, c='b')
plt.plot(e2.x, e2.y, c='r')
```

Out[11]:
```
[<matplotlib.lines.Line2D at 0x7fefacbf1790>]
```



In [13]:
```
# Ho : Scoring patterns in both innings are same
# Ha : Scoring patterns are different

kstest(df_first_innings["runs"],df_second_innings["runs"])

# pvalue is high --> fail to reject the Ho
```

Out[13]:
```
KstestResult(statistic=0.1999971207493406, pvalue=0.2086874783173226)
```

In [ ]:
```

```

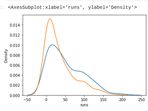
In [14]:
```
df.groupby(["Won"])["runs"].mean()
```

Out[14]:
```
Won
False    35.130682
True     51.000000
Name: runs, dtype: float64
```

In [15]:
```
df_won = df.df["Won"==True]
df_lost = df.df["Won"==False]
```

In [16]:
```
sns.kdeplot(df_won["runs"])
sns.kdeplot(df_lost["runs"])
```

Out[16]:
```
<AxesSubplot:xlabel='runs', ylabel='Density'>
```



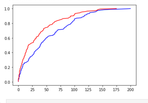
In [17]:
```
# H0: No differenc
ttest_ind(df_won["runs"], df_lost["runs"])
# P values is very low -->
```

Out[17]:
```
Ttest_indResult(statistic=3.6280685639603043, pvalue=0.000327061549736553116)
```

In [18]:
```
e1 = ECDF(df_won["runs"])
e2 = ECDF(df_lost["runs"])
```

In [20]:
```
plt.plot(e1.x, e1.y, c='b')
plt.plot(e2.x, e2.y, c='r')
```

Out[20]:
```
[<matplotlib.lines.Line2D at 0x7fef78c37a90>]
```



In [ ]:
```

```

In [ ]:
```

```

QQ Plot

In [22]:
```
# When I want to check whether the distribution is Gaussian or not?
```

In [32]:
```
df1=pd.read_csv("weight-height.csv")
df1
```

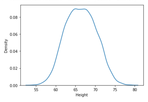
Out[32]:

	Gender	Height	Weight
0	Male	73.847017	241.893563
1	Male	68.781904	162.310473
2	Male	74.110105	212.740856
3	Male	71.730978	220.042470
4	Male	69.881796	206.349801
...	...	...	...
9995	Female	66.172652	136.777454
9996	Female	67.067155	170.867906
9997	Female	63.867992	128.475319
9998	Female	69.034243	163.852461
9999	Female	61.944246	113.649103

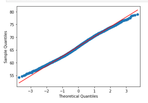
10000 rows × 3 columns

In [33]:
```
sns.kdeplot(df1["Height"])
```

Out[33]:
```
<AxesSubplot:xlabel='Height', ylabel='Density'>
```



In [39]:
```
qqplot(df1["Height"],line="s")
plt.show()
```



In [40]:
```
df2=pd.read_csv("waiting_time.csv")
df2
```

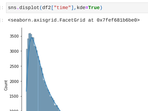
Out[40]:

	time
0	184.003075
1	36.721521
2	29.970417
3	75.640285
4	61.489439
...	...
90041	135.885984
90042	15.223970
90043	207.839528
90044	140.488418
90045	50.719544

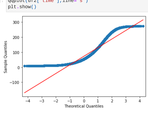
90046 rows × 1 columns

In [41]:
```
sns.displot(df2["time"],kde=True)
```

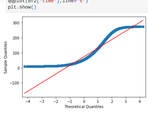
Out[41]:
```
<seaborn.axisgrid.FacetGrid at 0x7fef68106be0>
```



In [42]:
```
qqplot(df2["time"],line="s")
plt.show()
```



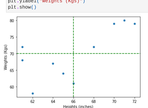
In [48]:
```
qqplot(df2["time"],line="s")
plt.show()
```



In [ ]:
```

```

Correlation Covariance

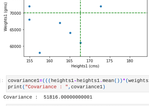
In [57]:
```
# Ravi -->
heights = np.array([68, 62, 64, 61, 70, 66, 61, 65, 71, 72]) # inches
weights = np.array([72, 58, 67, 72, 79, 61, 68, 64, 80, 79]) # kgs

sns.scatterplot(x=heights, y=weights)
plt.axvline(heights.mean(),color="green",linestyle="--")
plt.axhline(weights.mean(),color="green",linestyle="--")

plt.xlabel("Heights (inches)")
plt.ylabel("Weights (kgs)")
plt.show()
```



In [60]:
```
covariance=((heights-heights.mean())*(weights-weights.mean())).sum()/len(heights)
print("Covariance :",covariance)
```

```
Covariance :  20.4
```

In [59]:
```
# Rishav --> USA
heights1 = np.array([68, 62, 64, 61, 70, 66, 61, 65, 71, 72])*2.54 # cms
weights1 = np.array([72, 58, 67, 72, 79, 61, 68, 64, 80, 79])*1000 # gms

sns.scatterplot(x=heights1, y=weights1)
plt.axvline(heights1.mean(),color="green",linestyle="--")
plt.axhline(weights1.mean(),color="green",linestyle="--")

plt.xlabel("Heights1 (cms)")
plt.ylabel("Weights1 (gms)")
plt.show()
```



In [61]:
```
covariance1=((heights1-heights1.mean())*(weights1-weights1.mean())).sum()/len(heights1)
print("Covariance :",covariance1)
```

```
Covariance :  51816.00000000001
```

In [63]:
```
covariance/(heights.std()*weights.std())
```

Out[63]:
```
0.7084289771951878
```

In [64]:
```
covariance1/(heights1.std()*weights1.std())
```

Out[64]:
```
0.7084289771951878
```

In [ ]:

In [ ]: