Importing Libraries

In [201]:

```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
%matplotlib inline
```

Importing Data

In [202]:

```
data = pd.read_csv('Data/Graduate Admission.csv')
data.head()
```

Out[202]:

	Serial No.	GRE Score	TOEFL Score	University Rating	SOP	LOR	CGPA	Research	Admit
0	1	337	118	4	4.5	4.5	9.65	0.92	1
1	2	324	107	4	4.0	4.5	8.87	0.76	1
2	3	316	104	3	3.0	3.5	8.00	0.72	1
3	4	322	110	3	3.5	2.5	8.67	0.80	1
4	5	314	103	2	2.0	3.0	8.21	0.65	0

In [203]:

```
data.shape
```

Out[203]:

```
(400, 9)
```

Checking for Null Values

In [204]:

```
data.isnull().sum()
```

Out[204]:

```
Serial No.           0
GRE Score            0
TOEFL Score          0
University Rating    0
SOP                  0
LOR                  0
CGPA                 0
Research             0
Admit                0
dtype: int64
```

Dropping irrelevant Columns

In [205]:

```
data.drop(columns = ['Serial No.'], axis = 1, inplace = True)
data.head()
```

Out[205]:

	GRE Score	TOEFL Score	University Rating	SOP	LOR	CGPA	Research	Admit
0	337	118	4	4.5	4.5	9.65	0.92	1
1	324	107	4	4.0	4.5	8.87	0.76	1
2	316	104	3	3.0	3.5	8.00	0.72	1
3	322	110	3	3.5	2.5	8.67	0.80	1
4	314	103	2	2.0	3.0	8.21	0.65	0

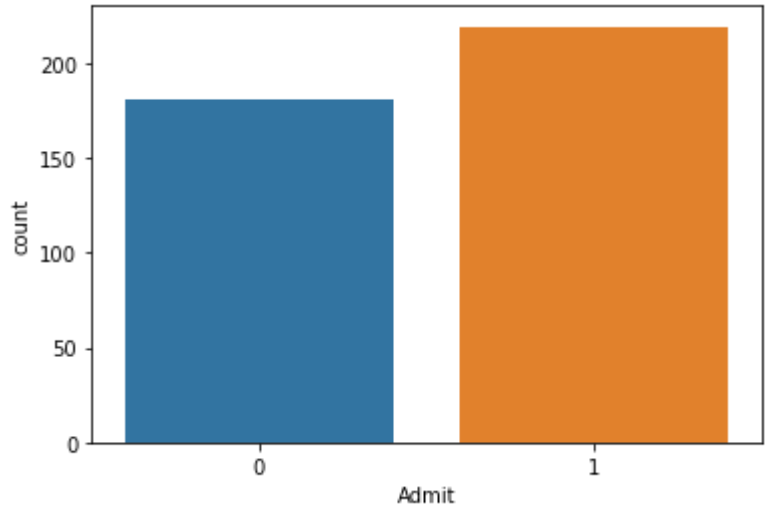
Data Visualisation

In [206]:

```
sns.countplot(x = 'Admit', data = data)
```

Out[206]:

```
<matplotlib.axes._subplots.AxesSubplot at 0x2721ec28>
```

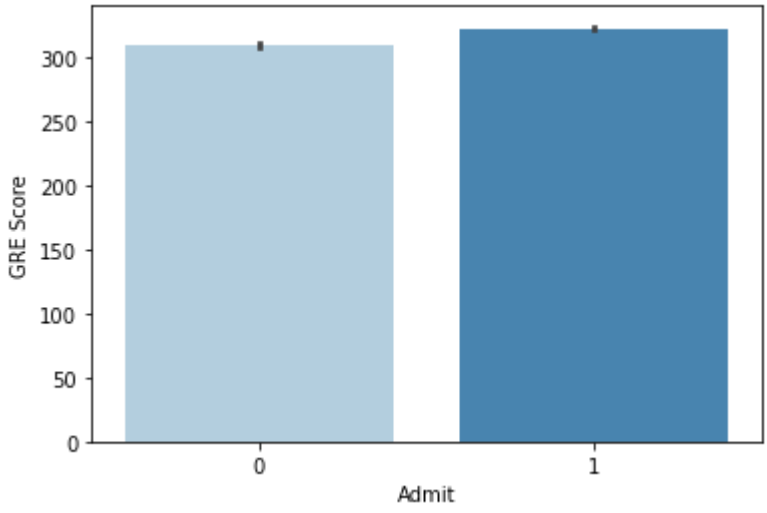


In [207]:

```
sns.barplot(x = 'Admit', y = 'GRE Score', data = data, palette = 'Blues')
```

Out[207]:

```
<matplotlib.axes._subplots.AxesSubplot at 0x2724d748>
```

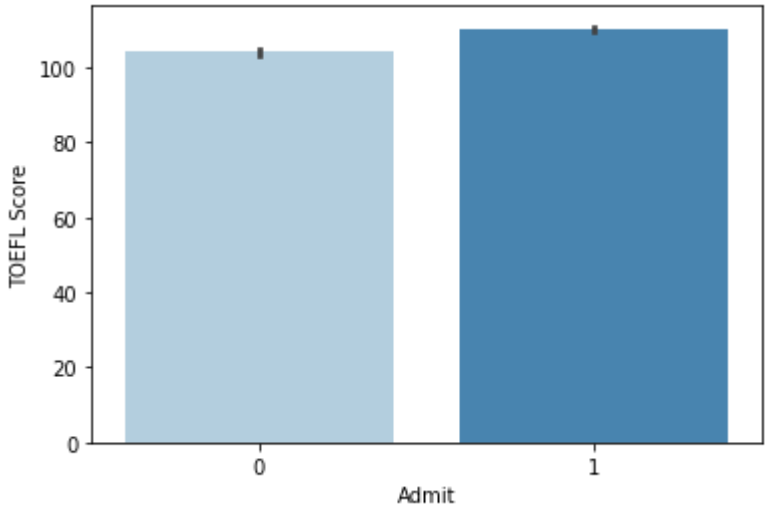


In [208]:

```
sns.barplot(x = 'Admit', y = 'TOEFL Score', data = data, palette = 'Blues')
```

Out[208]:

```
<matplotlib.axes._subplots.AxesSubplot at 0x2727a3d0>
```

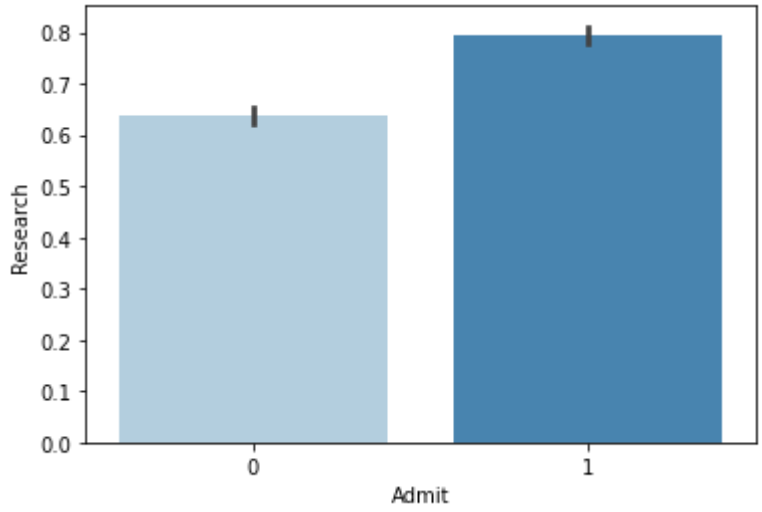


In [209]:

```
sns.barplot(x = 'Admit', y = 'Research', data = data, palette = 'Blues')
```

Out[209]:

```
<matplotlib.axes._subplots.AxesSubplot at 0x25fc9178>
```

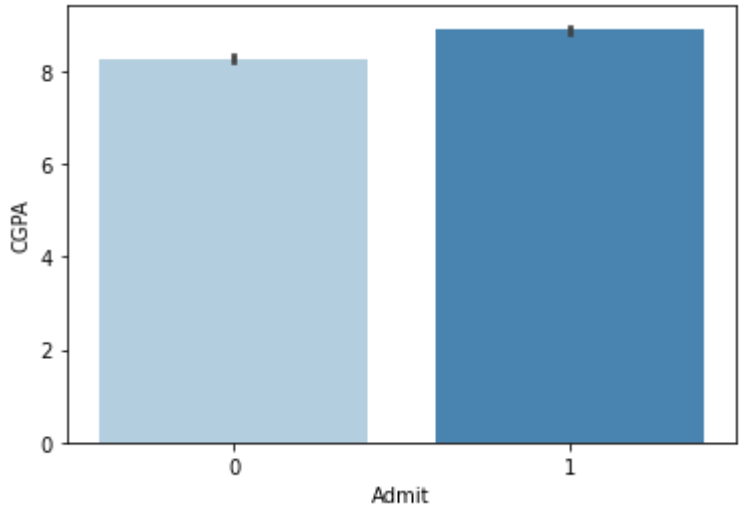


In [210]:

```
sns.barplot(x = 'Admit', y = 'CGPA', data = data, palette = 'Blues')
```

Out[210]:

```
<matplotlib.axes._subplots.AxesSubplot at 0x271219e8>
```



Checking for Out-Liers in data

In [211]:

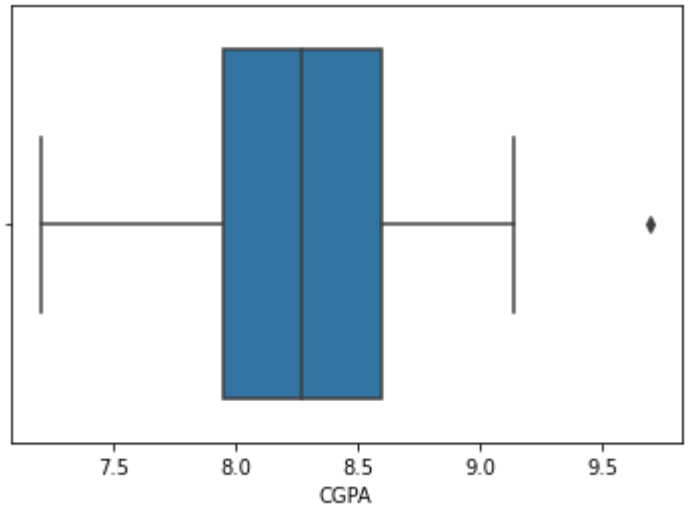
```
focus1 = data[data['Admit'] == 1]
focus0 = data[data['Admit'] == 0]
```

In [212]:

```
sns.boxplot(x = 'CGPA', data = focus0)
```

Out[212]:

```
<matplotlib.axes._subplots.AxesSubplot at 0x27283fe8>
```



theres one out-lier which needs to be treated

In [213]:

```
focus0[focus0['CGPA'] == focus0['CGPA'].max()]
```

Out[213]:

	GRE Score	TOEFL Score	University Rating	SOP	LOR	CGPA	Research	Admit
47	339	119	5	4.5	4.0	9.7	0.89	0

In [214]:

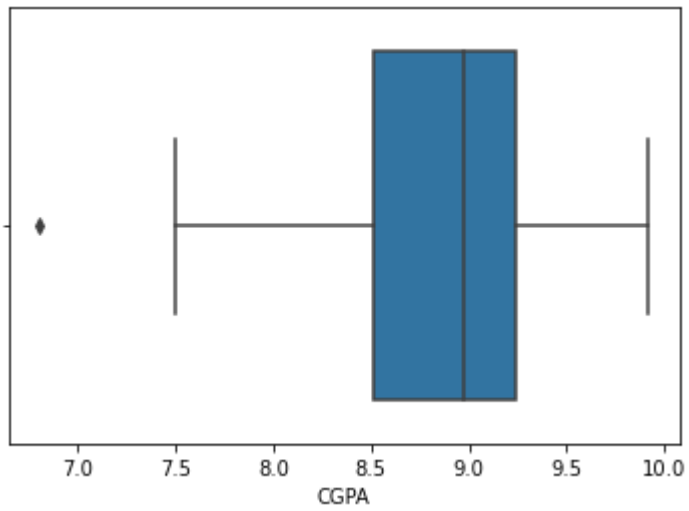
```
data.drop([47], inplace = True)
```

In [215]:

```
sns.boxplot(x = 'CGPA', data = focus1)
```

Out[215]:

```
<matplotlib.axes._subplots.AxesSubplot at 0x27314a00>
```



there is a out-lier in the lower spectrum of the CGPA as well

In [216]:

```
focus1[focus1['CGPA'] == focus1['CGPA'].min()]
```

Out[216]:

	GRE Score	TOEFL Score	University Rating	SOP	LOR	CGPA	Research	Admit
58	300	99	1	3.0	2.0	6.8	0.36	1

In [217]:

```
data.drop([58], inplace = True)
```

In [218]:

```
data.shape
```

Out[218]:

```
(398, 8)
```

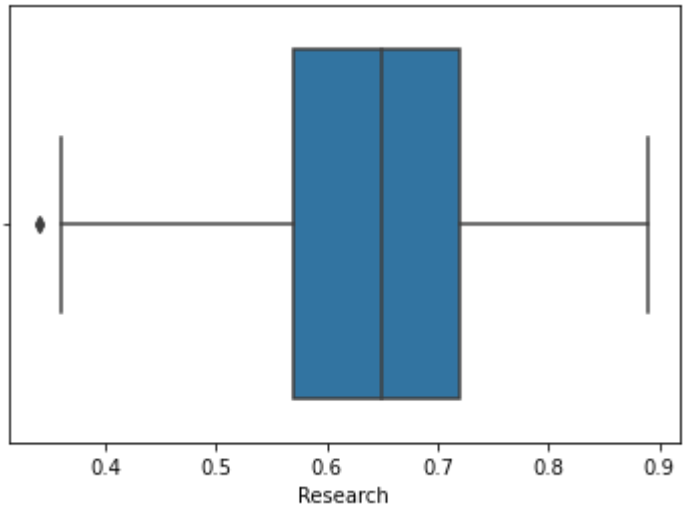
Checking for outliers in Research

In [219]:

```
sns.boxplot(x = 'Research', data = focus0)
```

Out[219]:

```
<matplotlib.axes._subplots.AxesSubplot at 0x2734fc58>
```

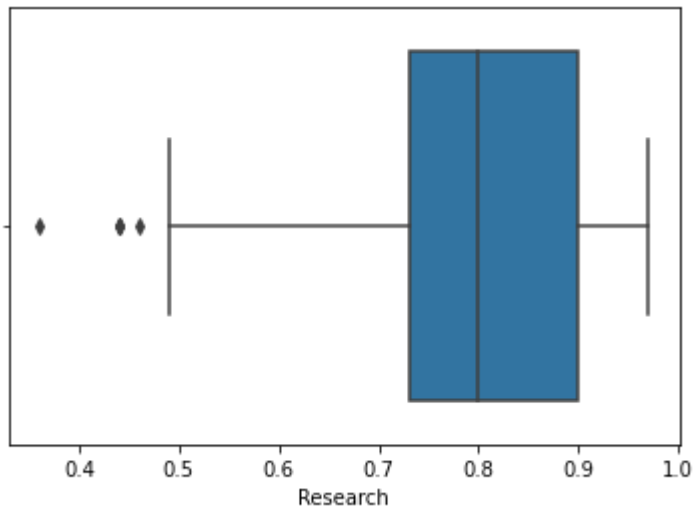


In [220]:

```
sns.boxplot(x = 'Research', data = focus1)
```

Out[220]:

```
<matplotlib.axes._subplots.AxesSubplot at 0x27381c28>
```



these 3 outliers have to be treated

In [221]:

```
focus1[focus1['Research'] < 0.5]
```

Out[221]:

	GRE Score	TOEFL Score	University Rating	SOP	LOR	CGPA	Research	Admit
27	298	98	2	1.5	2.5	7.50	0.44	1
40	308	110	3	3.5	3.0	8.00	0.46	1
41	316	105	2	2.5	2.5	8.20	0.49	1
58	300	99	1	3.0	2.0	6.80	0.36	1
78	296	95	2	3.0	2.0	7.54	0.44	1
93	301	97	2	3.0	3.0	7.88	0.44	1

removing 3 least data points from this

In [222]:

```
data.drop([27,40,78,93],inplace = True)
```

In [223]:

```
data
```

Out[223]:

	GRE Score	TOEFL Score	University Rating	SOP	LOR	CGPA	Research	Admit
0	337	118	4	4.5	4.5	9.65	0.92	1
1	324	107	4	4.0	4.5	8.87	0.76	1
2	316	104	3	3.0	3.5	8.00	0.72	1
3	322	110	3	3.5	2.5	8.67	0.80	1
4	314	103	2	2.0	3.0	8.21	0.65	0
...	...	...	...	...	...	...	...	...
395	324	110	3	3.5	3.5	9.04	0.82	1
396	325	107	3	3.0	3.5	9.11	0.84	1
397	330	116	4	5.0	4.5	9.45	0.91	1
398	312	103	3	3.5	4.0	8.78	0.67	0
399	333	117	4	5.0	4.0	9.66	0.95	1

394 rows × 8 columns

Checking Correlation and Predicting Values

In [224]:

```
data.corr()
```

Out[224]:

	GRE Score	TOEFL Score	University Rating	SOP	LOR	CGPA	Research	Admit
GRE Score	1.000000	0.831724	0.661737	0.610357	0.549056	0.828548	0.797496	0.617238
TOEFL Score	0.831724	1.000000	0.689517	0.657130	0.560952	0.826875	0.790826	0.523075
University Rating	0.661737	0.689517	1.000000	0.734723	0.655682	0.741571	0.708737	0.471688
SOP	0.610357	0.657130	0.734723	1.000000	0.730737	0.723093	0.681660	0.459972
LOR	0.549056	0.560952	0.655682	0.730737	1.000000	0.664274	0.665015	0.417316
CGPA	0.828548	0.826875	0.741571	0.723093	0.664274	1.000000	0.868501	0.566307
Research	0.797496	0.790826	0.708737	0.681660	0.665015	0.868501	1.000000	0.602150
Admit	0.617238	0.523075	0.471688	0.459972	0.417316	0.566307	0.602150	1.000000

In [225]:

```
sns.heatmap(data.corr())
```

Out[225]:

```
<matplotlib.axes._subplots.AxesSubplot at 0x273b36a0>
```

We see LOR and SOP doesn't really contribute to the Admit of the student

In [227]:

```
data.columns
```

Out[227]:

```
Index(['GRE Score', 'TOEFL Score', 'University Rating', 'SOP', 'LOR ', 'CGP
A',
       'Research', 'Admit'],
      dtype='object')
```

Importing Sci-Kit Learn Library functions

In [237]:

```
from sklearn.linear_model import LogisticRegression
from sklearn.model_selection import train_test_split
```

In [242]:

```
x = data[['GRE Score', 'TOEFL Score', 'University Rating', 'SOP', 'LOR ', 'CGPA','Research'
y = data['Admit']
```

In [246]:

```
x_train, x_test, y_train, y_test = train_test_split(x, y, test_size = 0.25, random_state =
```

In [247]:

```
logistic_regressor = LogisticRegression()
logistic_regressor.fit(x_train, y_train)
```

```
c:\users\subha\appdata\local\programs\python\python38-32\lib\site-packages\s
klearn\linear_model\_logistic.py:762: ConvergenceWarning: lbfgs failed to co
nverge (status=1):
STOP: TOTAL NO. of ITERATIONS REACHED LIMIT.

Increase the number of iterations (max_iter) or scale the data as shown in:
    https://scikit-learn.org/stable/modules/preprocessing.html (https://scik
it-learn.org/stable/modules/preprocessing.html)
Please also refer to the documentation for alternative solver options:
    https://scikit-learn.org/stable/modules/linear_model.html#logistic-regre
ssion (https://scikit-learn.org/stable/modules/linear_model.html#logistic-re
gression)
  n_iter_i = _check_optimize_result(
```

Out[247]:

```
LogisticRegression()
```

In [248]:

```
y_pred = logistic_regressor.predict(x_test)
print('Accuracy of logistic regression classifier on test set: {:.6f}'.format(logistic_regr
```

```
Accuracy of logistic regression classifier on test set: 0.818182
```

Accuracy of the Model is 81.8182 %