# Problem Statement

# Linear Regression

# Import Libraries

In [1]:

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

In [2]:

```
a=pd.read_csv("uber.csv")
a
```

Out[2]:

| | id | key | fare_amount | pickup_datetime | pickup_longitude | pickup_latitude | dropoff_longit |
|---|---|---|---|---|---|---|---|
| **0** | 24238194 | 2015-05-07 19:52:06 | 7.5 | 2015-05-07 19:52:06 UTC | -73.999817 | 40.738354 | -73.999 |
| **1** | 27835199 | 2009-07-17 20:04:56 | 7.7 | 2009-07-17 20:04:56 UTC | -73.994355 | 40.728225 | -73.994 |
| **2** | 44984355 | 2009-08-24 21:45:00 | 12.9 | 2009-08-24 21:45:00 UTC | -74.005043 | 40.740770 | -73.962 |
| **3** | 25894730 | 2009-06-26 08:22:21 | 5.3 | 2009-06-26 08:22:21 UTC | -73.976124 | 40.790844 | -73.965 |
| **4** | 17610152 | 2014-08-28 17:47:00 | 16.0 | 2014-08-28 17:47:00 UTC | -73.925023 | 40.744085 | -73.973 |

# To display top 10 rows

In [3]:

```
c=a.head(15)
c
```

Out[3]:

| | id | key | fare_amount | pickup_datetime | pickup_longitude | pickup_latitude | drop |
|---|---|---|---|---|---|---|---|
| **0** | 24238194 | 2015-05-07 19:52:06 | 7.5 | 2015-05-07 19:52:06 UTC | -73.999817 | 40.738354 | |
| **1** | 27835199 | 2009-07-17 20:04:56 | 7.7 | 2009-07-17 20:04:56 UTC | -73.994355 | 40.728225 | |
| **2** | 44984355 | 2009-08-24 21:45:00 | 12.9 | 2009-08-24 21:45:00 UTC | -74.005043 | 40.740770 | |
| **3** | 25894730 | 2009-06-26 08:22:21 | 5.3 | 2009-06-26 08:22:21 UTC | -73.976124 | 40.790844 | |
| **4** | 17610152 | 2014-08-28 17:47:00 | 16.0 | 2014-08-28 17:47:00 UTC | -73.925023 | 40.744085 | |
| **5** | 44470845 | 2011-02-12 02:27:09 | 4.9 | 2011-02-12 02:27:09 UTC | -73.969019 | 40.755910 | |
| **6** | 48725865 | 2014-10-12 07:04:00 | 24.5 | 2014-10-12 07:04:00 UTC | -73.961447 | 40.693965 | |
| **7** | 44195482 | 2012-12-11 13:52:00 | 2.5 | 2012-12-11 13:52:00 UTC | 0.000000 | 0.000000 | |
| **8** | 15822268 | 2012-02-17 09:32:00 | 9.7 | 2012-02-17 09:32:00 UTC | -73.975187 | 40.745767 | |
| **9** | 50611056 | 2012-03-29 19:06:00 | 12.5 | 2012-03-29 19:06:00 UTC | -74.001065 | 40.741787 | |
| **10** | 2205147 | 2015-05-22 17:32:27 | 6.5 | 2015-05-22 17:32:27 UTC | -73.974388 | 40.746952 | |
| **11** | 6379048 | 2011-05-23 22:15:00 | 8.5 | 2011-05-23 22:15:00 UTC | 0.000000 | 0.000000 | |
| **12** | 31892535 | 2011-05-17 14:03:00 | 3.3 | 2011-05-17 14:03:00 UTC | -73.966378 | 40.804440 | |
| **13** | 13012786 | 2011-06-25 11:19:00 | 10.9 | 2011-06-25 11:19:00 UTC | -73.953352 | 40.767382 | |
| **14** | 48411337 | 2010-04-06 22:20:27 | 6.9 | 2010-04-06 22:20:27 UTC | -73.973370 | 40.755193 | |

# To find Missing values

In [4]:

```
c.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 15 entries, 0 to 14
Data columns (total 9 columns):
 #   Column             Non-Null Count  Dtype  
---  ------             --------------  -----  
 0   id                 15 non-null     int64  
 1   key                15 non-null     object 
 2   fare_amount        15 non-null     float64
 3   pickup_datetime    15 non-null     object 
 4   pickup_longitude   15 non-null     float64
 5   pickup_latitude    15 non-null     float64
 6   dropoff_longitude  15 non-null     float64
 7   dropoff_latitude   15 non-null     float64
 8   passenger_count    15 non-null     int64  
dtypes: float64(5), int64(2), object(2)
memory usage: 1.2+ KB
```

# To display summary of statistics

In [5]:

```
a.describe()
```

Out[5]:

| | id | fare_amount | pickup_longitude | pickup_latitude | dropoff_longitude | dro |
|---|---|---|---|---|---|---|
| **count** | 2.000000e+05 | 200000.000000 | 200000.000000 | 200000.000000 | 199999.000000 | 19 |
| **mean** | 2.771250e+07 | 11.359955 | -72.527638 | 39.935885 | -72.525292 | |
| **std** | 1.601382e+07 | 9.901776 | 11.437787 | 7.720539 | 13.117408 | |
| **min** | 1.000000e+00 | -52.000000 | -1340.648410 | -74.015515 | -3356.666300 | |
| **25%** | 1.382535e+07 | 6.000000 | -73.992065 | 40.734796 | -73.991407 | |
| **50%** | 2.774550e+07 | 8.500000 | -73.981823 | 40.752592 | -73.980093 | |
| **75%** | 4.155530e+07 | 12.500000 | -73.967153 | 40.767158 | -73.963659 | |
| **max** | 5.542357e+07 | 499.000000 | 57.418457 | 1644.421482 | 1153.572603 | |

# To display column heading

In [6]:

```
a.columns
```

Out[6]:

```
Index(['id', 'key', 'fare_amount', 'pickup_datetime', 'pickup_longitude',
       'pickup_latitude', 'dropoff_longitude', 'dropoff_latitude',
       'passenger_count'],
      dtype='object')
```

# Pairplot

In [7]:

```
s=a.dropna(axis=1)
s
```

Out[7]:

| | id | key | fare_amount | pickup_datetime | pickup_longitude | pickup_latitude |
|---|---|---|---|---|---|---|
| **0** | 24238194 | 2015-05-07 19:52:06 | 7.5 | 2015-05-07 19:52:06 UTC | -73.999817 | 40.738354 |
| **1** | 27835199 | 2009-07-17 20:04:56 | 7.7 | 2009-07-17 20:04:56 UTC | -73.994355 | 40.728225 |
| **2** | 44984355 | 2009-08-24 21:45:00 | 12.9 | 2009-08-24 21:45:00 UTC | -74.005043 | 40.740770 |
| **3** | 25894730 | 2009-06-26 08:22:21 | 5.3 | 2009-06-26 08:22:21 UTC | -73.976124 | 40.790844 |
| **4** | 17610152 | 2014-08-28 17:47:00 | 16.0 | 2014-08-28 17:47:00 UTC | -73.925023 | 40.744085 |
| **...** | ... | ... | ... | ... | ... | ... |
| **199995** | 42598914 | 2012-10-28 10:49:00 | 3.0 | 2012-10-28 10:49:00 UTC | -73.987042 | 40.739367 |
| **199996** | 16382965 | 2014-03-14 01:09:00 | 7.5 | 2014-03-14 01:09:00 UTC | -73.984722 | 40.736837 |
| **199997** | 27804658 | 2009-06-29 00:42:00 | 30.9 | 2009-06-29 00:42:00 UTC | -73.986017 | 40.756487 |
| **199998** | 20259894 | 2015-05-20 14:56:25 | 14.5 | 2015-05-20 14:56:25 UTC | -73.997124 | 40.725452 |
| **199999** | 11951496 | 2010-05-15 04:08:00 | 14.1 | 2010-05-15 04:08:00 UTC | -73.984395 | 40.720077 |

200000 rows × 7 columns

In [8]:

```
s.columns
```

Out[8]:

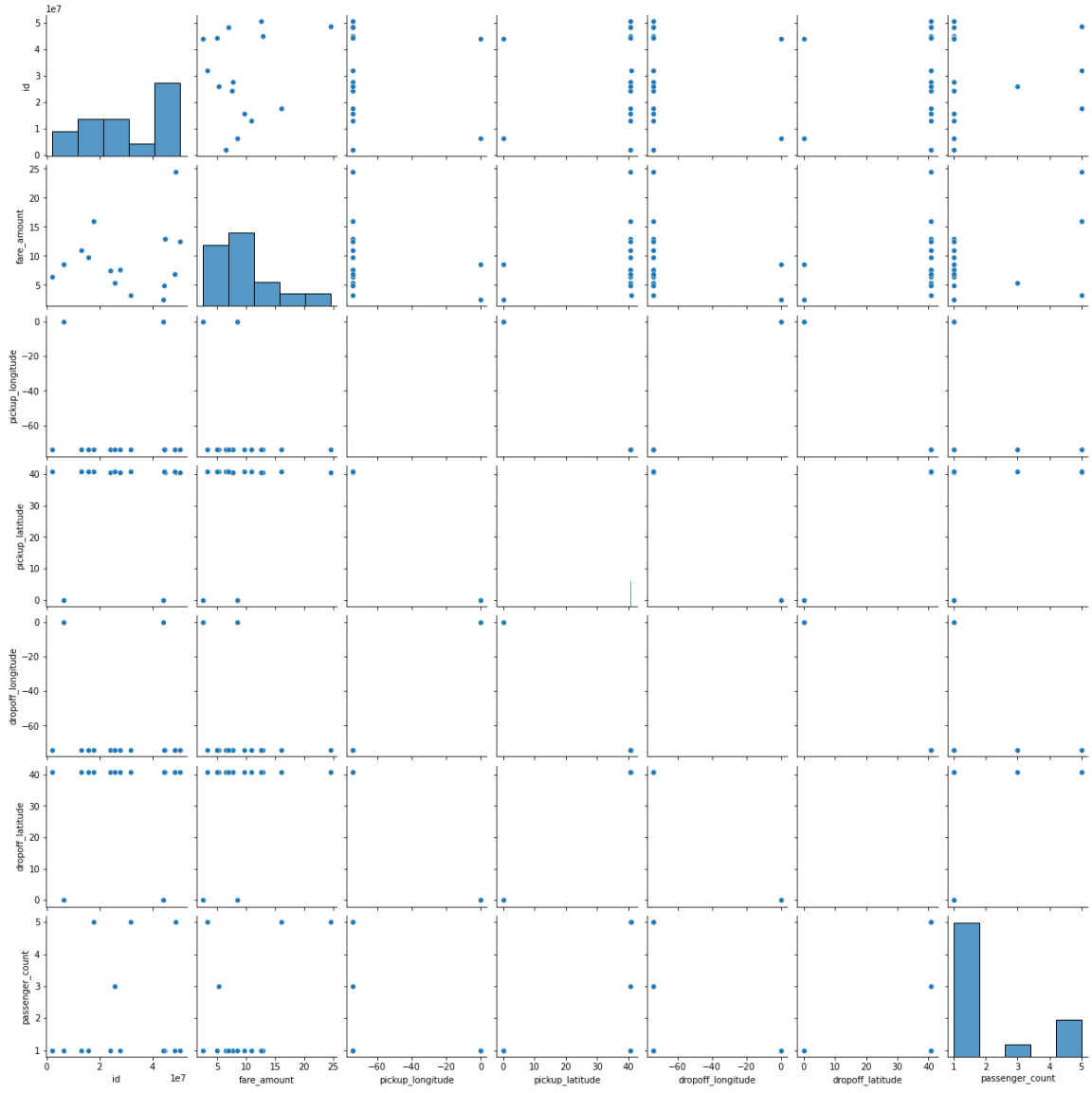
```
Index(['id', 'key', 'fare_amount', 'pickup_datetime', 'pickup_longitude',
       'pickup_latitude', 'passenger_count'],
      dtype='object')
```

In [9]:

```
sns.pairplot(c)
```

Out[9]:

```
<seaborn.axisgrid.PairGrid at 0x2acb6166eb0>
```




# Distribution Plot

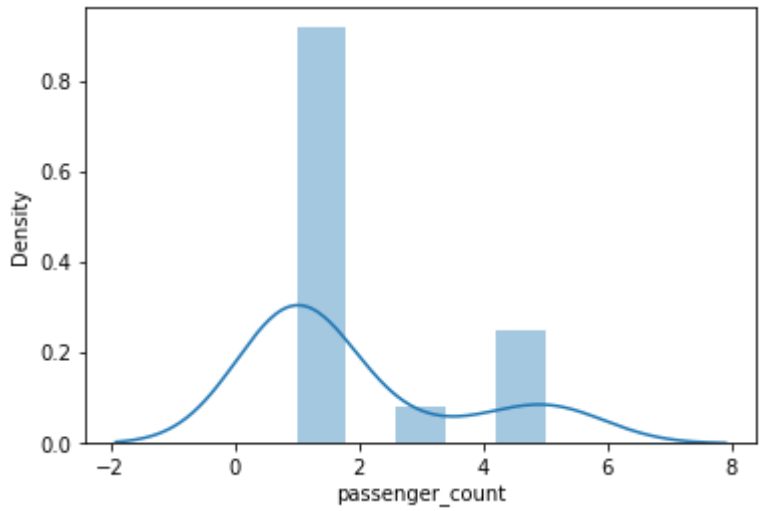
In [10]:

```
sns.distplot(c['passenger_count'])
```

```
C:\ProgramData\Anaconda3\lib\site-packages\seaborn\distributions.py:2557:
FutureWarning: `distplot` is a deprecated function and will be removed in
a future version. Please adapt your code to use either `displot` (a figure
-level function with similar flexibility) or `histplot` (an axes-level fun
ction for histograms).
  warnings.warn(msg, FutureWarning)
```

Out[10]:

```
<AxesSubplot:xlabel='passenger_count', ylabel='Density'>
```



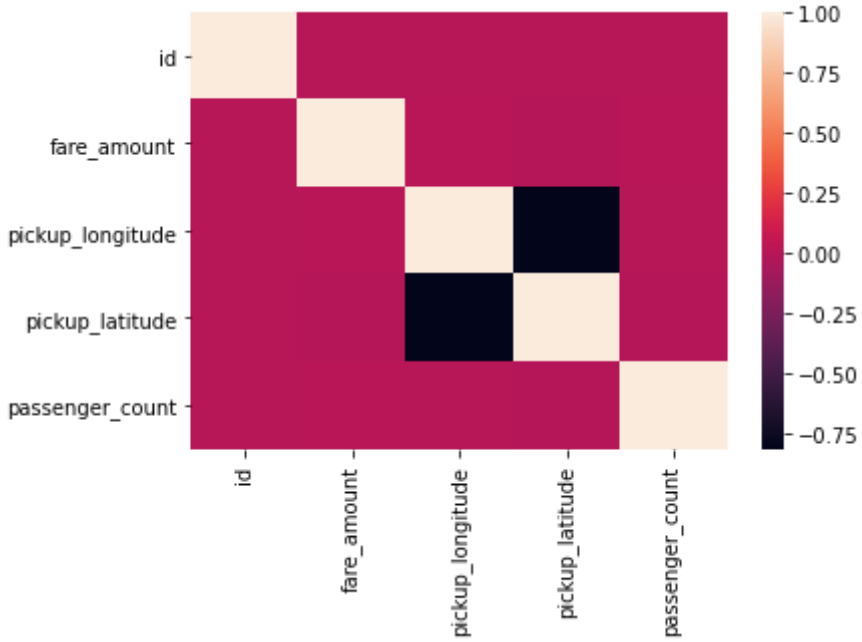

# Correlation

In [11]:

```
b=a[['id', 'key', 'fare_amount', 'pickup_datetime', 'pickup_longitude',
       'pickup_latitude', 'passenger_count']]
sns.heatmap(b.corr())
```

Out[11]:

<AxesSubplot:>




# Train the model - Model Building

In [12]:

```
g=c[['id']]
h=c['passenger_count']
```

# To split dataset into training end test

In [13]:

```
from sklearn.model_selection import train_test_split
g_train,g_test,h_train,h_test=train_test_split(g,h,test_size=0.6)
```

# To run the model

In [14]:

```
from sklearn.linear_model import LinearRegression
```

In [15]:

```
lr=LinearRegression()
lr.fit(g_train,h_train)
```

Out[15]:

```
LinearRegression()
```

In [16]:

```
print(lr.intercept_)
```

```
2.008954987118392
```

# Coeffecient

In [17]:

```
coeff=pd.DataFrame(lr.coef_,g.columns,columns=['Co-effecient'])
coeff
```

Out[17]:

| | Co-effecient |
|---|---|
| **id** | -1.933861e-08 |

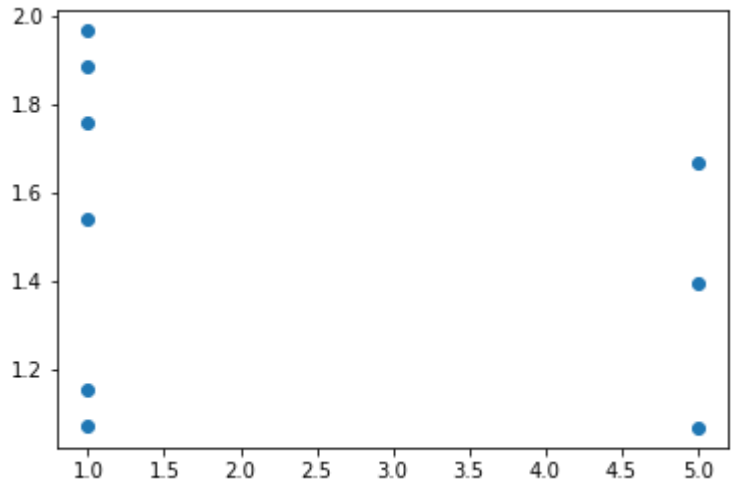
# Best Fit line

In [18]:

```
prediction=lr.predict(g_test)
plt.scatter(h_test,prediction)
```

Out[18]:

```
<matplotlib.collections.PathCollection at 0x2acc75fcd00>
```




# To find score

In [19]:

```
print(lr.score(g_test,h_test))
```

```
-0.318731485300195
```

# Import Lasso and ridge

In [20]:

```
from sklearn.linear_model import Ridge,Lasso
```

# Ridge

In [21]:

```
ri=Ridge(alpha=5)
ri.fit(g_train,h_train)
```

Out[21]:

```
Ridge(alpha=5)
```

In [22]:

```
ri.score(g_test,h_test)
```

Out[22]:

```
-0.31873148530019413
```

In [23]:

```
ri.score(g_train,h_train)
```

Out[23]:

```
0.10491211106749343
```

# Lasso

In [24]:

```
l=Lasso(alpha=6)
l.fit(g_train,h_train)
```

Out[24]:

```
Lasso(alpha=6)
```

In [25]:

```
l.score(g_test,h_test)
```

Out[25]:

```
-0.31873133509424334
```

In [26]:

```
ri.score(g_train,h_train)
```

Out[26]:

```
0.10491211106749343
```

# ElasticNet

In [27]:

```
from sklearn.linear_model import ElasticNet
e=ElasticNet()
e.fit(g_train,h_train)
```

Out[27]:

```
ElasticNet()
```

# Coeffecient,intercept

In [28]:

```
print(e.coef_)
```

```
[-1.93386088e-08]
```

In [29]:

```
print(e.intercept_)
```

```
2.0089548750338424
```

# Prediction

In [30]:

```
d=e.predict(g_test)
d
```

Out[30]:

```
array([1.9663104 , 1.06666444, 1.39219762, 1.15427574, 1.7573057 ,
       1.07274697, 1.88559296, 1.66839904, 1.54022192])
```

In [31]:

```
print(e.score(g_test,h_test))
```

```
-0.31873147278302016
```

# Evaluation

In [32]:

```
from sklearn import metrics
print("Mean Absolute error:",metrics.mean_absolute_error(h_test,d))
```

```
Mean Absolute error: 1.58324362262317
```

In [33]:

```
print("Mean Squared error:",metrics.mean_squared_error(h_test,d))
```

```
Mean Squared error: 4.6888230143396274
```

In [34]:

```
print("Mean Squared error:",np.sqrt(metrics.mean_squared_error(h_test,d)))
```

```
Mean Squared error: 2.165369024979259
```

In [ ]:

```

```