In [1]:

```python
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
from scipy import stats
import statsmodels.formula.api as smf
```

In [2]:

```python
dt=pd.read_csv('delivery_time.csv')
dt
```

Out[2]:

	Delivery Time	Sorting Time
0	21.00	10
1	13.50	4
2	19.75	6
3	24.00	9
4	29.00	10
5	15.35	6
6	19.00	7
7	9.50	3
8	17.90	10
9	18.75	9
10	19.83	8
11	10.75	4
12	16.68	7
13	11.50	3
14	12.03	3
15	14.88	4
16	13.75	6
17	18.11	7
18	8.00	2
19	17.83	7
20	21.50	5

In [3]:

```python
dt.describe()
```

Out[3]:

	Delivery Time	Sorting Time
count	21.000000	21.000000
mean	16.790952	6.190476
std	5.074901	2.542028
min	8.000000	2.000000
25%	13.500000	4.000000
50%	17.830000	6.000000
75%	19.750000	8.000000
max	29.000000	10.000000

In [4]:

```
dt.corr()
```

Out[4]:

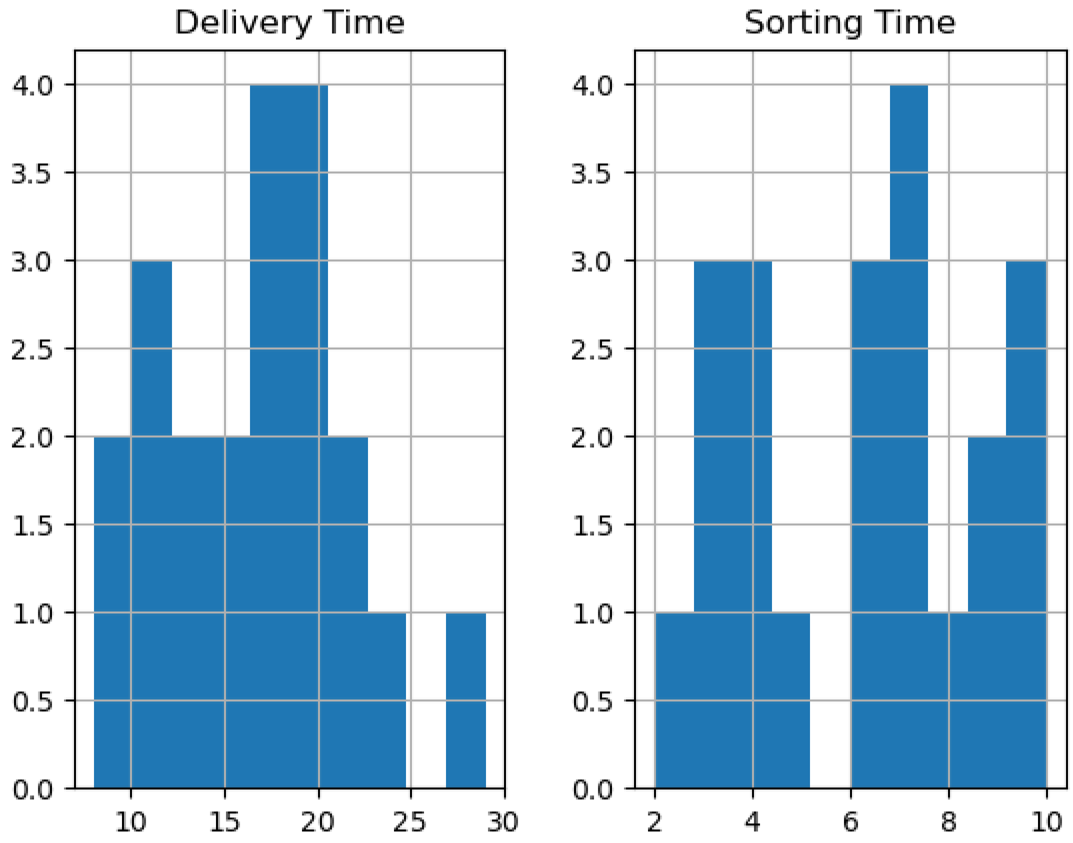
	Delivery Time	Sorting Time
Delivery Time	1.000000	0.825997
Sorting Time	0.825997	1.000000

In [5]:

```
dt.hist()
```

Out[5]:

```
array([[<AxesSubplot:title={'center':'Delivery Time'}>,
        <AxesSubplot:title={'center':'Sorting Time'}>]], dtype=object)
```



In [6]:

```
dt=dt.rename({'Delivery Time':'delivery_time','Sorting Time':'sorting_time'},axis=1)
dt
```

Loading [MathJax]/extensions/Safe.js

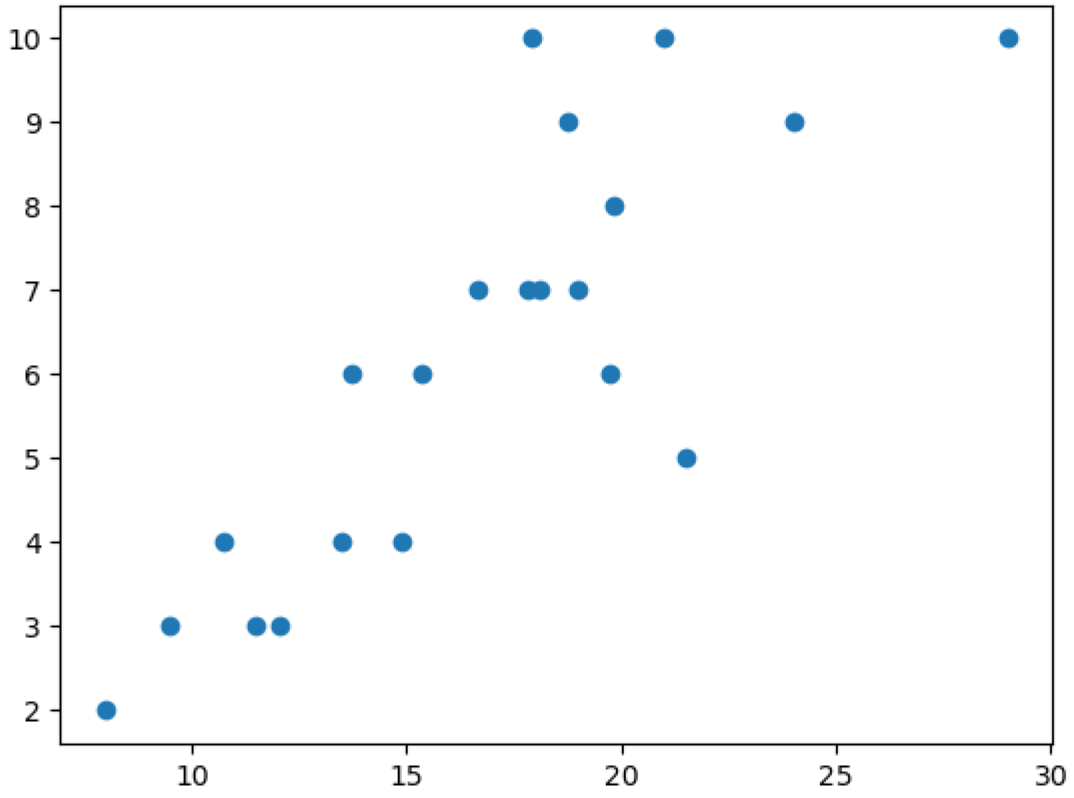
Out[6]:

	delivery_time	sorting_time
0	21.00	10
1	13.50	4
2	19.75	6
3	24.00	9
4	29.00	10
5	15.35	6
6	19.00	7
7	9.50	3
8	17.90	10
9	18.75	9
10	19.83	8
11	10.75	4
12	16.68	7
13	11.50	3
14	12.03	3
15	14.88	4
16	13.75	6
17	18.11	7
18	8.00	2
19	17.83	7
20	21.50	5

In [7]:

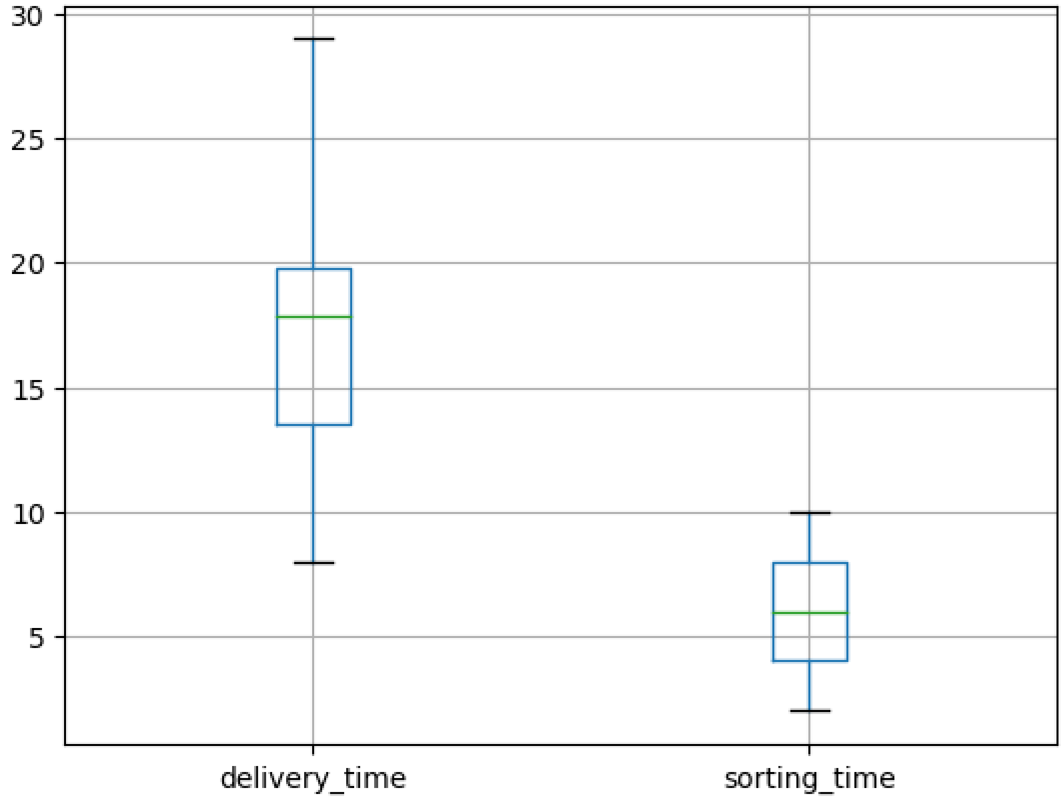
```
x = dt.delivery_time
y = dt.sorting_time
plt.scatter(x,y)
plt.xlabel=("delivery_time")
plt.ylabel=("sorting_time")
```

Loading [MathJax]/extensions/Safe.js



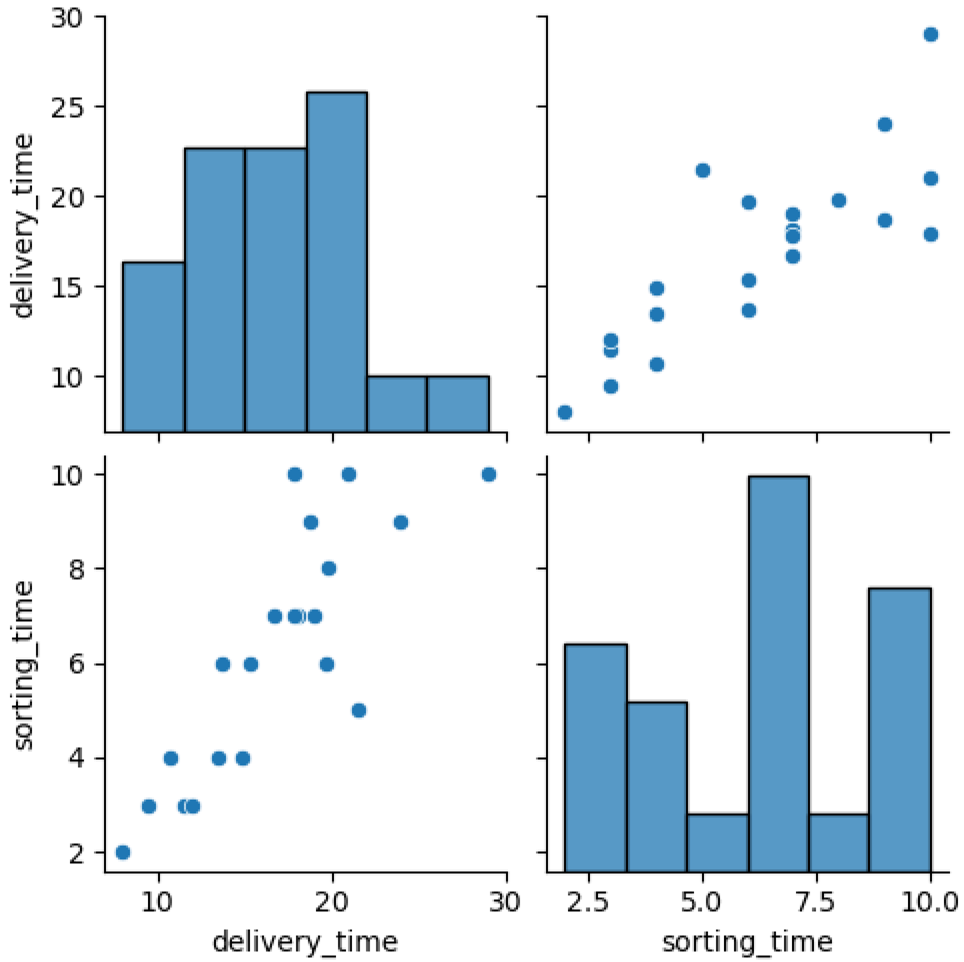
In [8]:
```
dt.boxplot()
```

Out[8]:
```
<AxesSubplot:>
```



In [9]:
```
sns.pairplot(dt)
```

Out[9]:
```
<seaborn.axisgrid.PairGrid at 0x287430ec520>
```

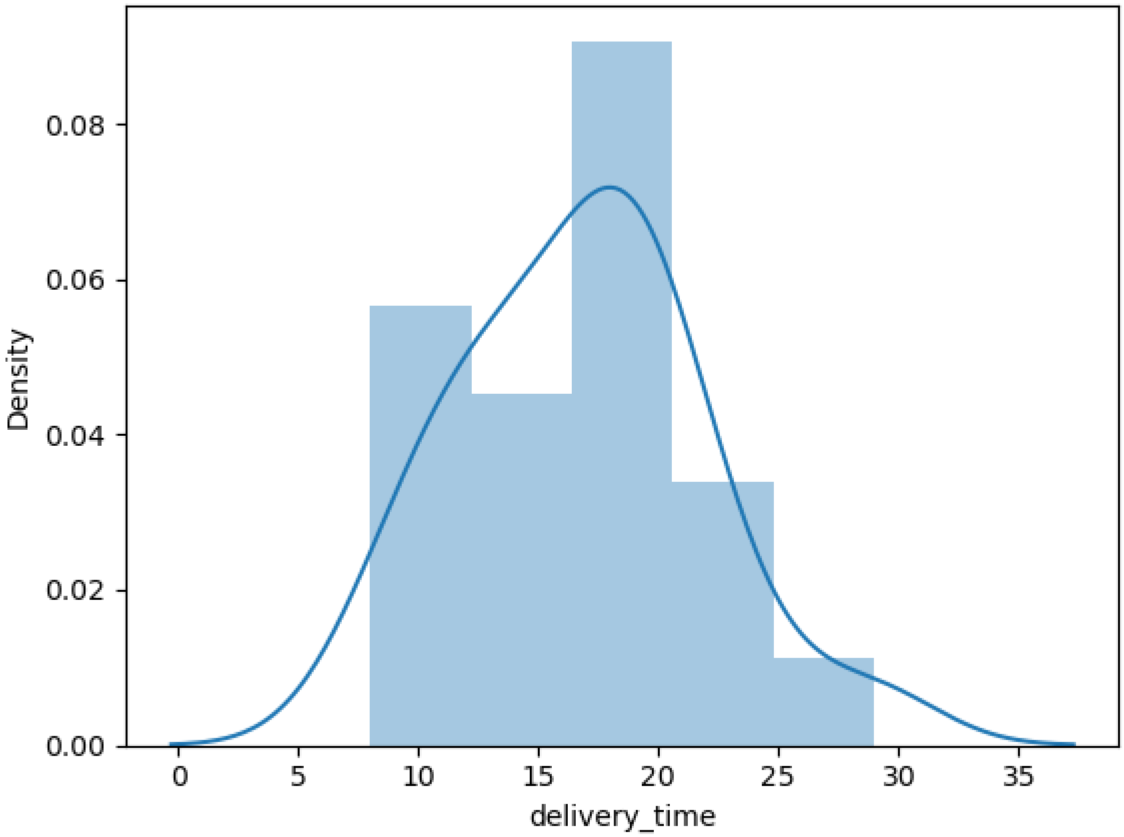


In [10]:
```
sns.distplot(dt['delivery_time'])
```

```
C:\Users\ROHIT\anaconda3\lib\site-packages\seaborn\distributions.py:2619: FutureWarning:
`distplot` is a deprecated function and will be removed in a future version. Please adap
t your code to use either `displot` (a figure-level function with similar flexibility) o
r `histplot` (an axes-level function for histograms).
  warnings.warn(msg, FutureWarning)
```

Out[10]:
```
<AxesSubplot:xlabel='delivery_time', ylabel='Density'>
```

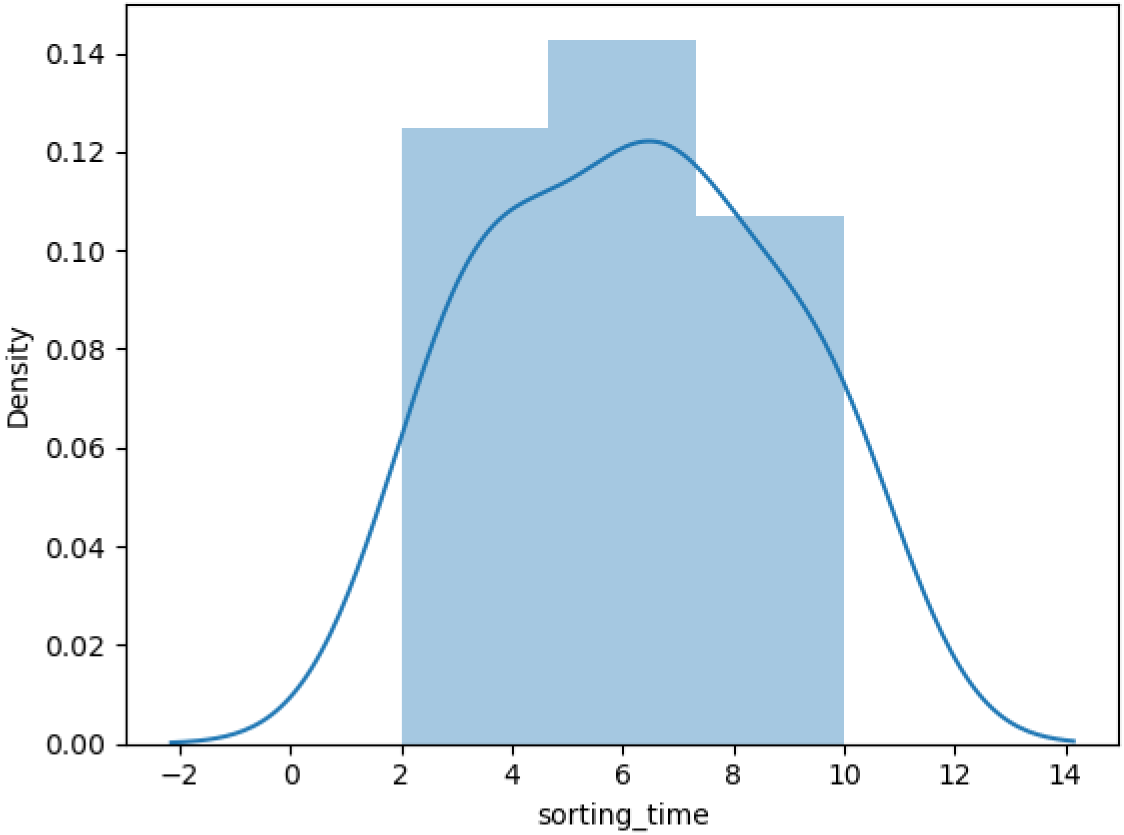
Loading [MathJax]/extensions/Safe.js



```
In [11]: sns.distplot(dt['sorting_time'])
```

```
C:\Users\ROHIT\anaconda3\lib\site-packages\seaborn\distributions.py:2619: FutureWarning:
`distplot` is a deprecated function and will be removed in a future version. Please adap
t your code to use either `displot` (a figure-level function with similar flexibility) o
r `histplot` (an axes-level function for histograms).
  warnings.warn(msg, FutureWarning)
```

```
Out[11]: <AxesSubplot:xlabel='sorting_time', ylabel='Density'>
```

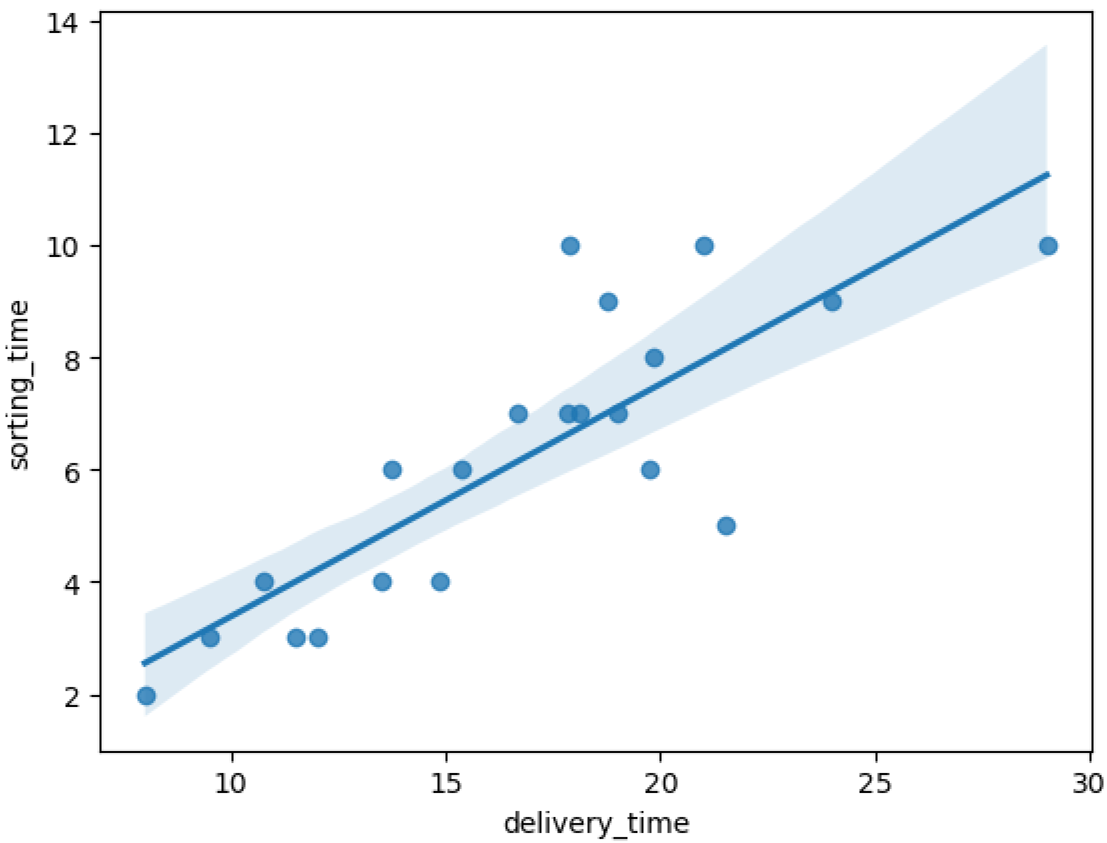


In [12]:

```
sns.regplot(x='delivery_time', y='sorting_time', data=dt)
```

Out[12]:

```
<AxesSubplot:xlabel='delivery_time', ylabel='sorting_time'>
```



In [13]:

```
model=smf.ols("sorting_time~delivery_time ", data=dt).fit()
model.summary()
```

Loading [MathJax]/extensions/Safe.js

Out[13]:

OLS Regression Results

Dep. Variable:	sorting_time	**R-squared:**	0.682
Model:	OLS	**Adj. R-squared:**	0.666
Method:	Least Squares	**F-statistic:**	40.80
Date:	Sun, 28 Jan 2024	**Prob (F-statistic):**	3.98e-06
Time:	21:02:39	**Log-Likelihood:**	-36.839
No. Observations:	21	**AIC:**	77.68
Df Residuals:	19	**BIC:**	79.77
Df Model:	1		
Covariance Type:	nonrobust		

	coef	**std err**	**t**	**P>|t|**	**[0.025**	**0.975]**
Intercept	-0.7567	1.134	-0.667	0.513	-3.130	1.617
delivery_time	0.4137	0.065	6.387	0.000	0.278	0.549

Omnibus:	1.409	**Durbin-Watson:**	1.346
Prob(Omnibus):	0.494	**Jarque-Bera (JB):**	0.371
Skew:	0.255	**Prob(JB):**	0.831
Kurtosis:	3.405	**Cond. No.**	62.1

Notes:
[1] Standard Errors assume that the covariance matrix of the errors is correctly specified.

In [14]:

```
model.params
```

Out[14]:

```
Intercept       -0.756673
delivery_time    0.413744
dtype: float64
```

In [15]:

```
print(model.tvalues,'\n' ,model.pvalues)
```

```
Intercept       -0.667290
delivery_time    6.387447
dtype: float64
 Intercept        0.512611
delivery_time    0.000004
dtype: float64
```

In [16]:

```
(model.rsquared,model.rsquared_adj)
```

Out[16]:

```
(0.6822714748417232, 0.6655489208860245)
```

In [17]:

```
model2 = smf.ols("np.log(sorting_time)~delivery_time", data=dt).fit()
model2.params
model2.summary()
```

Loading [MathJax]/extensions/Safe.js

Out[17]:

OLS Regression Results

Dep. Variable:	np.log(sorting_time)	**R-squared:**	0.695
Model:	OLS	**Adj. R-squared:**	0.679
Method:	Least Squares	**F-statistic:**	43.39
Date:	Sun, 28 Jan 2024	**Prob (F-statistic):**	2.64e-06
Time:	21:03:11	**Log-Likelihood:**	-0.85600
No. Observations:	21	**AIC:**	5.712
Df Residuals:	19	**BIC:**	7.801
Df Model:	1		
Covariance Type:	nonrobust		

	coef	**std err**	**t**	**P>|t|**	**[0.025**	**0.975]**
Intercept	0.4372	0.204	2.139	0.046	0.009	0.865
delivery_time	0.0769	0.012	6.587	0.000	0.052	0.101

Omnibus:	0.744	**Durbin-Watson:**	1.691
Prob(Omnibus):	0.689	**Jarque-Bera (JB):**	0.686
Skew:	-0.101	**Prob(JB):**	0.710
Kurtosis:	2.138	**Cond. No.**	62.1

Notes:
[1] Standard Errors assume that the covariance matrix of the errors is correctly specified.

In [18]:

```
(model2.rsquared,model2.rsquared_adj)
```

Out[18]:

```
(0.6954434611324223, 0.6794141696130761)
```

In [19]:

```
model3 = smf.ols("np.sqrt(sorting_time)~delivery_time", data=dt).fit()
model3.params
model3.summary()
```

Loading [MathJax]/extensions/Safe.js

Out[19]:

OLS Regression Results

Dep. Variable:	np.sqrt(sorting_time)	**R-squared:**	0.696
Model:	OLS	**Adj. R-squared:**	0.680
Method:	Least Squares	**F-statistic:**	43.46
Date:	Sun, 28 Jan 2024	**Prob (F-statistic):**	2.61e-06
Time:	21:03:38	**Log-Likelihood:**	-3.5906
No. Observations:	21	**AIC:**	11.18
Df Residuals:	19	**BIC:**	13.27
Df Model:	1		
Covariance Type:	nonrobust		

	coef	std err	t	P>|t|	[0.025	0.975]
Intercept	0.9609	0.233	4.128	0.001	0.474	1.448
delivery_time	0.0877	0.013	6.592	0.000	0.060	0.116

Omnibus:	0.087	**Durbin-Watson:**	1.498
Prob(Omnibus):	0.957	**Jarque-Bera (JB):**	0.114
Skew:	0.099	**Prob(JB):**	0.945
Kurtosis:	2.698	**Cond. No.**	62.1

Notes:
[1] Standard Errors assume that the covariance matrix of the errors is correctly specified.

In [20]:
```
(model3.rsquared,model3.rsquared_adj)
```

Out[20]:
```
(0.695806227630867, 0.6797960290851232)
```

In [21]:
```
newdata=pd.Series([10,5])
```

In [22]:
```
data_pred=pd.DataFrame(newdata, columns=['delivery_time'])
data_pred
```

Out[22]:

	delivery_time
0	10
1	5

In [23]:
```
model3.predict(data_pred)
```

Out[23]:
```
0    1.837641
1    1.399287
dtype: float64
```

In [ ]: