

```
In [1]: import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns

In [2]: df=pd.read_excel("C:/Users/PC/Documents/Course/Salah/Salah.xlsx",sheet_name="Salah")

In [3]: df.head()

Out[3]:
```

	Project	Date	Month	Forecasted Calls	Calls Offered	Calls Handled	Calls Handled With in Threshold	Calls Abandon	ASA	Answer Time	Agent Name
0	Project A	2022-02-01	2025-02-22	13473	8393	8381	8380	12	1.689178	14157	Ali
1	Project A	2022-02-02	2025-02-22	13255	5144	5134	5096	10	2.337164	11999	Samir
2	Project A	2022-02-03	2025-02-22	13209	8450	8436	8432	14	1.874822	15816	Rania
3	Project A	2022-02-04	2025-02-22	13002	10883	10614	7376	269	51.207744	543519	Rania
4	Project A	2022-02-05	2025-02-22	12758	11445	11393	11027	52	7.235232	82431	Ahmed

```
In [7]: df[['Year', 'Month', 'Day']] = df['Month'].astype(str).str.split("-", expand=True)

In [8]: df.head()

Out[8]:
```

	Project	Date	Month	Forecasted Calls	Calls Offered	Calls Handled	Calls Handled With in Threshold	Calls Abandon	ASA	Answer Time	Agent Name	Year	Day
0	Project A	2022-02-01	02	13473	8393	8381	8380	12	1.689178	14157	Ali	2025	22
1	Project A	2022-02-02	02	13255	5144	5134	5096	10	2.337164	11999	Samir	2025	22
2	Project A	2022-02-03	02	13209	8450	8436	8432	14	1.874822	15816	Rania	2025	22
3	Project A	2022-02-04	02	13002	10883	10614	7376	269	51.207744	543519	Rania	2025	22
4	Project A	2022-02-05	02	12758	11445	11393	11027	52	7.235232	82431	Ahmed	2025	22

```
In [9]: df.drop(['Year',"Day"],axis=1,inplace=True)

In [10]: df.head()

Out[10]:
```

	Project	Date	Month	Forecasted Calls	Calls Offered	Calls Handled	Calls Handled With in Threshold	Calls Abandon	ASA	Answer Time	Agent Name
0	Project A	2022-02-01	02	13473	8393	8381	8380	12	1.689178	14157	Ali
1	Project A	2022-02-02	02	13255	5144	5134	5096	10	2.337164	11999	Samir
2	Project A	2022-02-03	02	13209	8450	8436	8432	14	1.874822	15816	Rania
3	Project A	2022-02-04	02	13002	10883	10614	7376	269	51.207744	543519	Rania
4	Project A	2022-02-05	02	12758	11445	11393	11027	52	7.235232	82431	Ahmed

Forecasted Calls & Calls Handled & Calls Offered by month

```
In [11]: month_calls_offered=df.groupby('Month')[['Calls Offered','Forecasted Calls','Calls Handled']].sum().astype('int64').reset_index()
month_calls_offered

Out[11]:
```

	Month	Calls Offered	Forecasted Calls	Calls Handled
0	02	446217	704490	444095
1	03	878081	978081	857397
2	04	422469	754500	420350

KPIs Target

```
In [8]: df[(df['Abandons_rate']<5) & (df['Calls Handled']>=12000) & (df['Calls Handled']<=14000)]

Out[8]:
```

	Project	Date	Month	Forecasted Calls	Calls Offered	Calls Handled	Calls Handled With in Threshold	Calls Abandon	ASA	Answer Time	Agent Name	Abandons_rate
6	Project A	2022-02-07	2025-02-22	11943	12155	12131	11945	24	2.794741	33903	Fatma	0.197450
25	Project A	2022-02-26	2025-02-22	12758	13437	12994	7440	443	49.683084	645582	Dina	3.296667
86	Project A	2022-03-03	2025-03-22	12545	13946	13256	5411	690	76.144312	1009369	Rania	4.947655
125	Project B	2022-03-11	2025-03-22	12818	13395	13260	12637	135	6.404525	84924	Mona	1.007839
131	Project B	2022-03-17	2025-03-22	16064	13611	13494	13462	117	2.040592	27529	Tariq	0.859599
133	Project B	2022-03-19	2025-03-22	15655	14008	13906	13880	100	1.649439	25722	Samir	0.713878
140	Project B	2022-03-26	2025-03-22	15655	13821	13732	13716	89	1.689528	25947	Huda	0.643948

```
In [13]: df['Abandons_rate']= (df['Calls Abandon'] / df['Calls Offered']) * 100

In [14]: Month_Abandon=df.groupby('Month')['Abandons_rate'].mean()
Month_Abandon

Out[14]:
```

Month	02	03	04
Abandons_rate	0.709513	1.456375	1.087398

dtype: float64

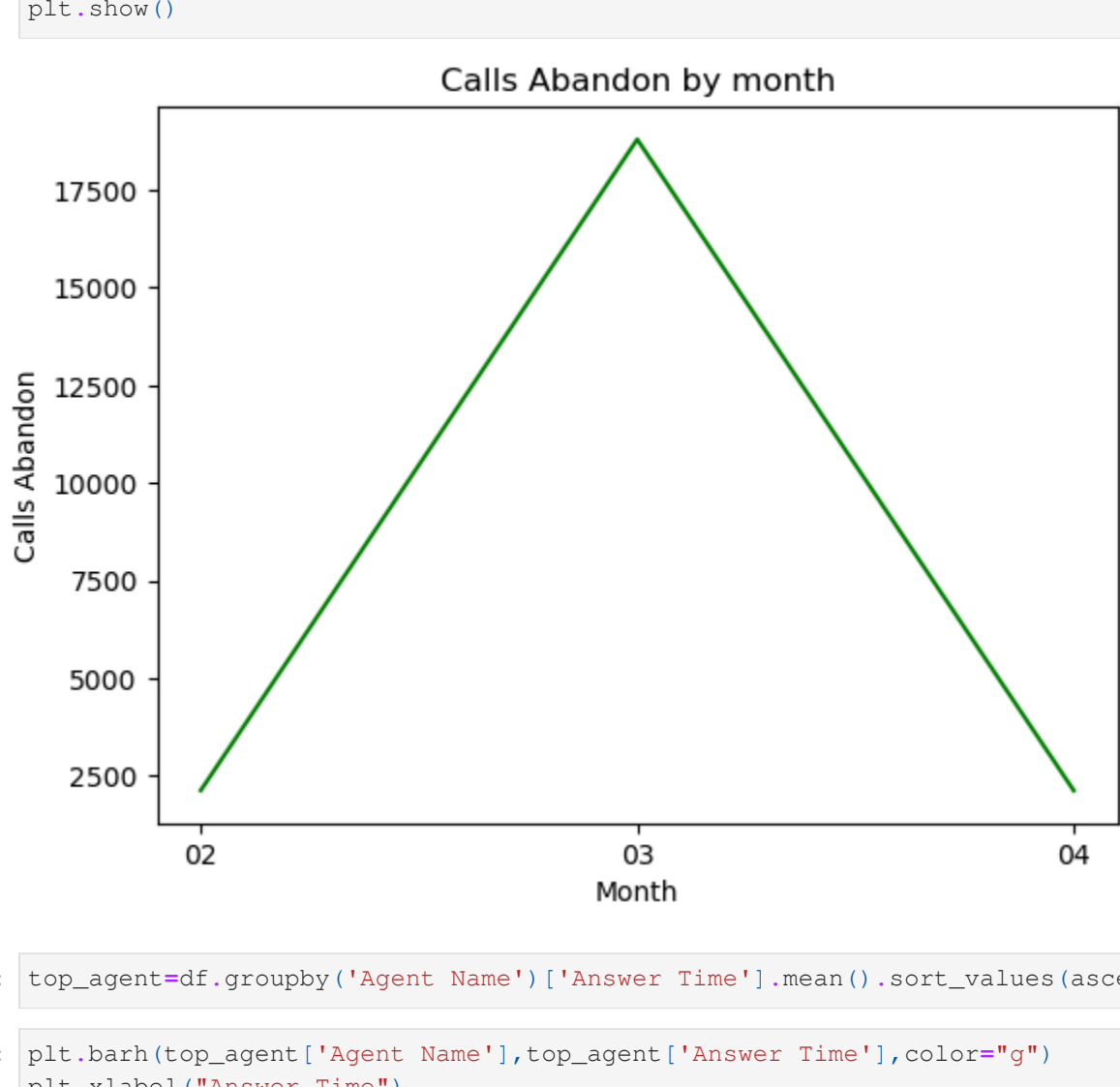
```
In [11]: df.groupby('Month')[['Forecasted Calls','Calls Handled','Calls Offered']].sum()

Out[11]:
```

	Forecasted Calls	Calls Handled	Calls Offered
Month			
02	704490	444095	446217
03	978081	857397	876199
04	754500	420350	422469

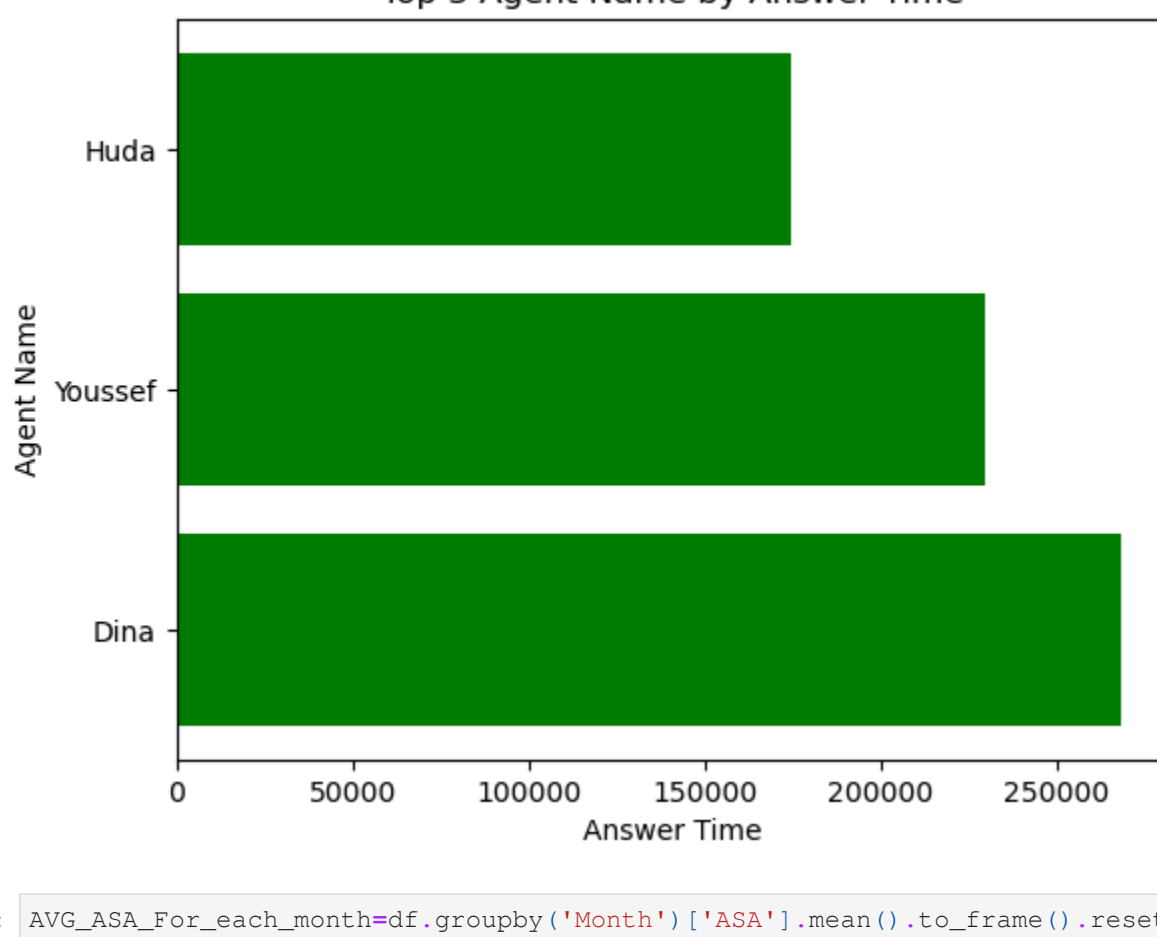
```
In [21]: Calls_abandon_month=df.groupby('Month')['Calls Abandon'].sum().to_frame().reset_index()

In [23]: plt.plot(Calls_abandon_month['Month'],Calls_abandon_month['Calls Abandon'],color='g')
plt.xlabel("Month")
plt.ylabel("Calls Abandon")
plt.title("Calls Abandon by month")
plt.show()
```



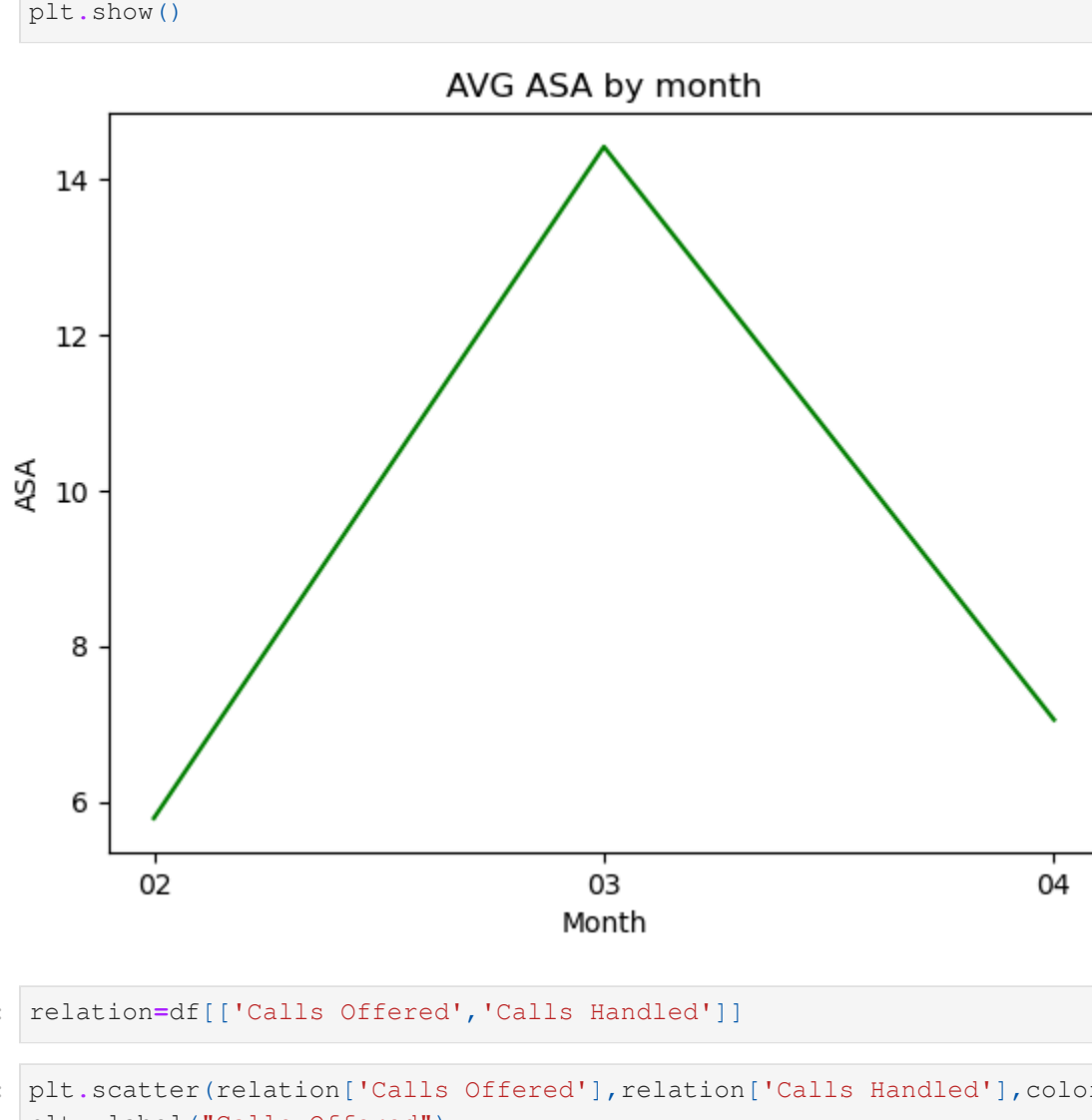
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In [40]: top_agent=df.groupby('Agent Name')['Answer Time'].mean().sort_values(ascending=False).head(3).to_frame().reset_index()

In [44]: plt.barh(top_agent['Agent Name'],top_agent['Answer Time'],color='g')
plt.xlabel("Answer Time")
plt.ylabel("Agent Name")
plt.title("Top 3 Agent Name by Answer Time")
plt.show()
```



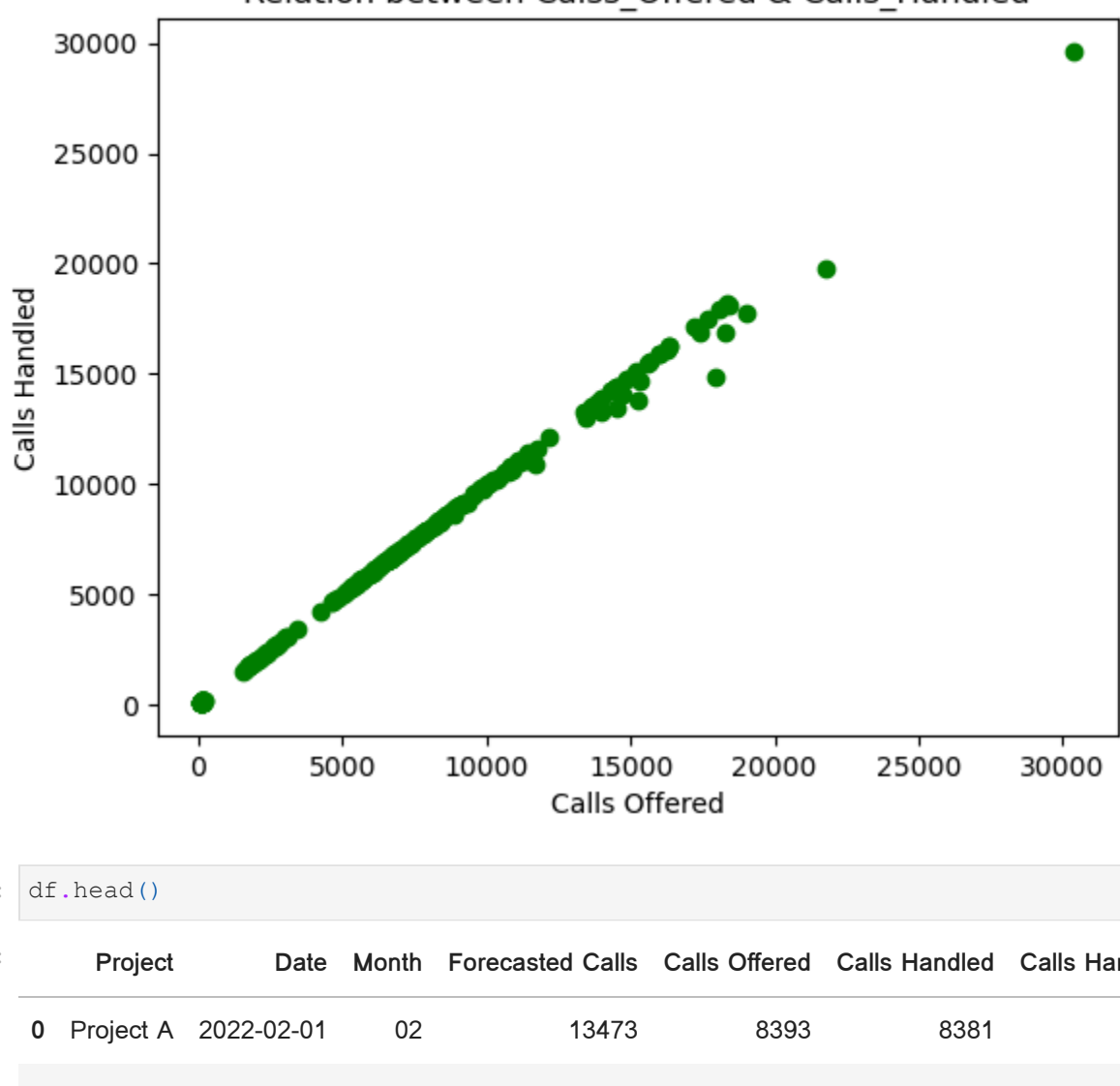
```
In [46]: AVG_ASA_For_each_month=df.groupby('Month')['ASA'].mean().to_frame().reset_index()

In [48]: plt.plot(AVG_ASA_For_each_month['Month'],AVG_ASA_For_each_month['ASA'],color='g')
plt.xlabel("Month")
plt.ylabel("ASA")
plt.title("AVG ASA by month")
plt.show()
```



```
In [61]: relation=df[['Calls Offered','Calls Handled']]

In [59]: plt.scatter(relation['Calls Offered'],relation['Calls Handled'],color='g')
plt.xlabel("Calls Offered")
plt.ylabel("Calls Handled")
plt.title("Relation between Calls_offered & Calls_Handled")
plt.show()
```



```
In [12]: df.head()

Out[12]:
```

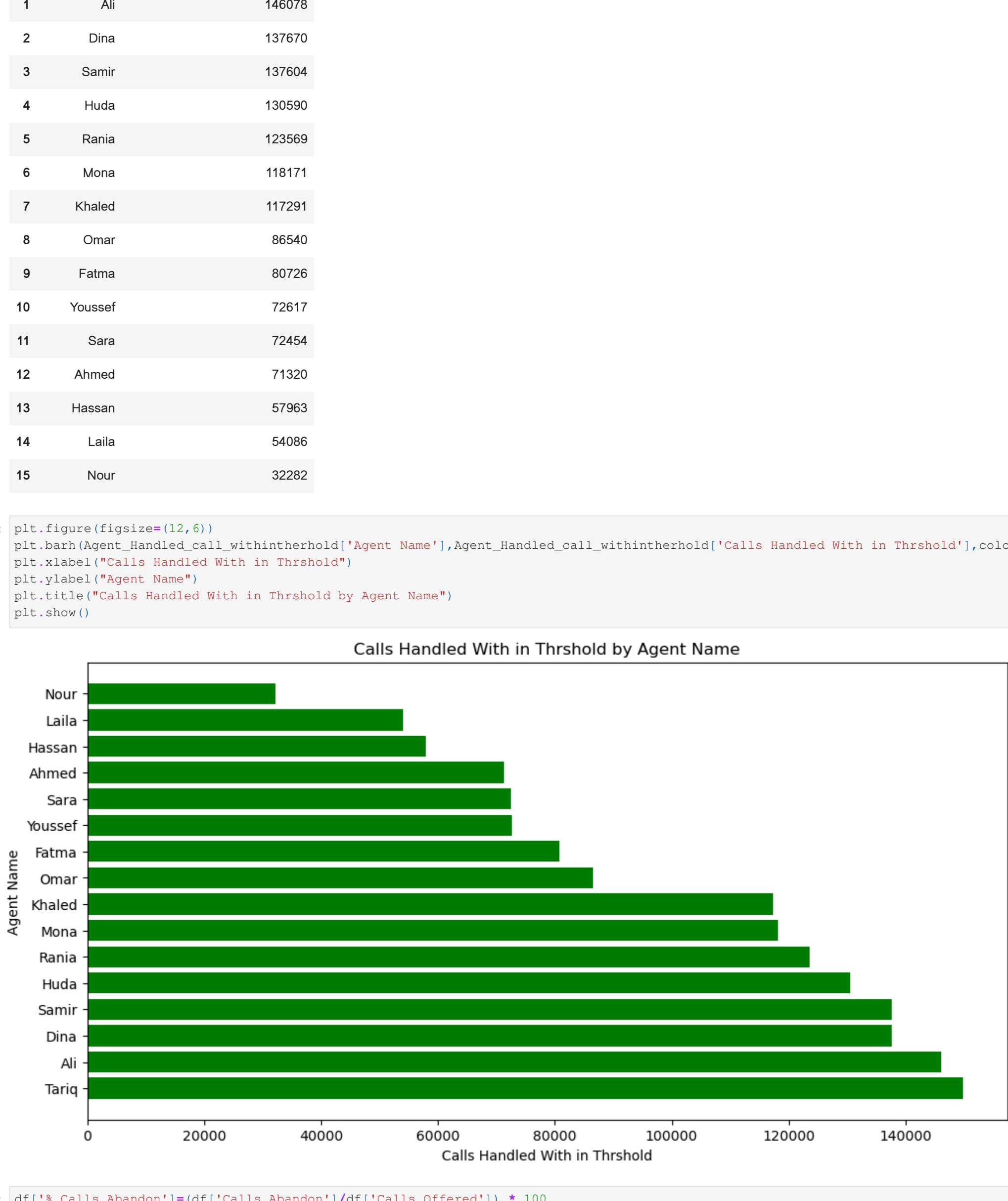
	Project	Date	Month	Forecasted Calls	Calls Offered	Calls Handled	Calls Handled With in Threshold	Calls Abandon	ASA	Answer Time	Agent Name
0	Project A	2022-02-01	02	13473	8393	8381	8380	12	1.689178	14157	Ali
1	Project A	2022-02-02	02	13255	5144	5134	5096	10	2.337164	11999	Samir
2	Project A	2022-02-03	02	13209	8450	8436	8432	14	1.874822	15816	Rania
3	Project A	2022-02-04	02	13002	10883	10614	7376	269	51.207744	543519	Rania
4	Project A	2022-02-05	02	12758	11445	11393	11027	52	7.235232	82431	Ahmed

```
In [5]: Agent_Handled_call_withinthreshold=df.groupby('Agent Name')['Calls Handled With in Threshold'].sum().sort_values(ascending=False).to_frame().reset_index()
Agent_Handled_call_withinthreshold

Out[5]:
```

	Agent Name	Calls Handled With in Threshold
0	Tariq	149923
1	Ali	146078
2	Dina	137670
3	Samir	137604
4	Huda	130590
5	Rania	123569
6	Mona	118171
7	Khaled	117291
8	Omar	86540
9	Fatma	80726
10	Youssef	72617
11	Sara	72454
12	Ahmed	71320
13	Hassan	57963
14	Laila	54086
15	Nour	32282

```
In [7]: plt.figure(figsize=(12,6))
plt.barh(Agent_Handled_call_withinthreshold['Agent Name'],Agent_Handled_call_withinthreshold['Calls Handled With in Threshold'],color='g')
plt.xlabel("Calls Handled With in Threshold")
plt.ylabel("Agent Name")
plt.title("Calls Handled With in Threshold by Agent Name")
plt.show()
```



```
In [33]: df[['Calls Abandon']] = df[['Calls Abandon']] / df[['Calls Offered']] * 100

In [34]: df.head()

Out[34]:
```

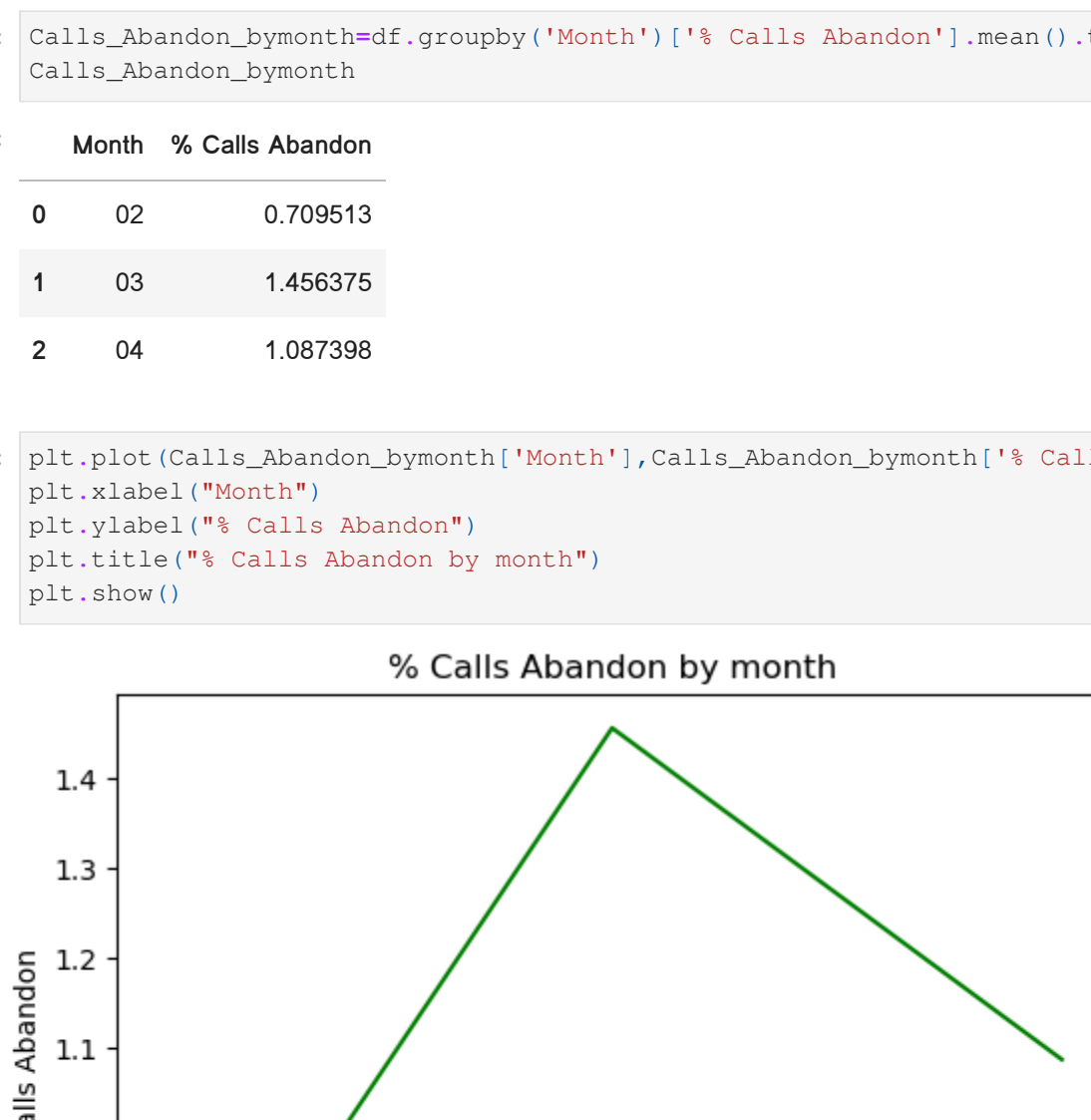
	Project	Date	Month	Forecasted Calls	Calls Offered	Calls Handled	Calls Handled With in Threshold	Calls Abandon	ASA	Answer Time	Agent Name	% Calls Abandon
0	Project A	2022-02-01	02	13473	8393	8381	8380	12	1.689178	14157	Ali	0.142976
1	Project A	2022-02-02	02	13255	5144	5134	5096	10	2.337164	11999	Samir	0.194401
2	Project A	2022-02-03	02	13209	8450	8436	8432	14	1.874822	15816	Rania	0.165680
3	Project A	2022-02-04	02	13002	10883	10614	7376	269	51.207744	543519	Rania	2.471745
4	Project A	2022-02-05	02	12758	11445	11393	11027	52	7.235232	82431	Ahmed	0.454347

```
In [40]: Calls_Abandon_bymonth=df.groupby('Month')['% Calls Abandon'].mean().to_frame().reset_index()
Calls_Abandon_bymonth

Out[40]:
```

	Month	% Calls Abandon
0	02	0.709513
1	03	1.456375
2	04	1.087398

```
In [41]: plt.plot(Calls_Abandon_bymonth['Month'],Calls_Abandon_bymonth['% Calls Abandon'],color='g')
plt.xlabel("Month")
plt.ylabel("% Calls Abandon")
plt.title("% Calls Abandon by month")
plt.show()
```



```
In [54]: handling_efficiency=(df[['Calls Handled']].sum()/df[['Calls Offered']].sum())*100.

In [65]: print(f"handling_efficiency is: {handling_efficiency.astype('int64')}")
handling_efficiency is: 98

In [70]: nums_correl=df[['Forecasted Calls','Calls Offered']]
correlation=nums_correl.corr()

In [69]: sns.heatmap(correlation,annot=True,cmap='Greens')

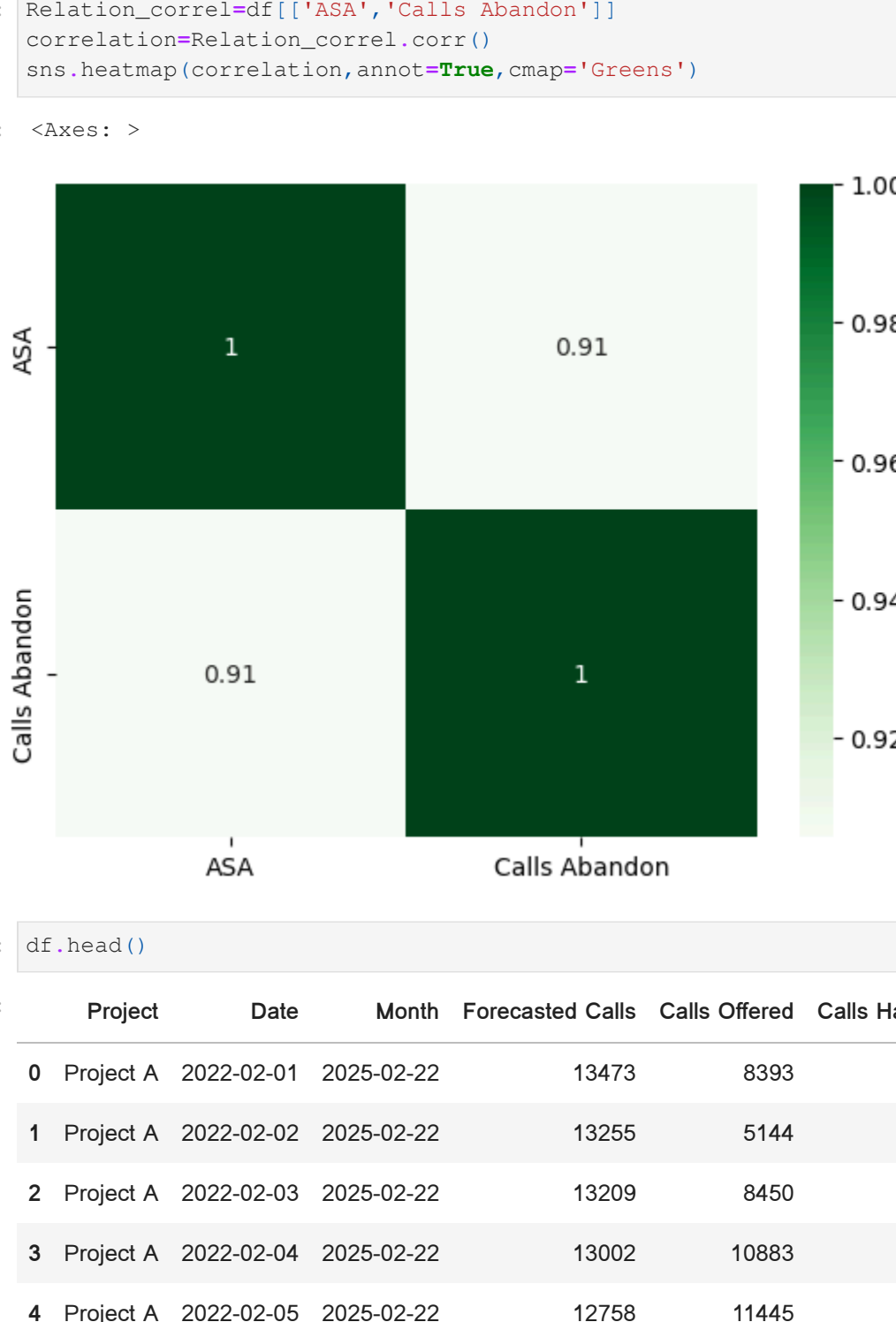
Out[69]: <Axes: >
```



Relation between ASA & Calls Abandon

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In [72]: Relation_correl=df[['ASA','Calls Abandon']]
correlation=Relation_correl.corr()
sns.heatmap(correlation,annot=True,cmap='Greens')

Out[72]: <Axes: >
```



```
In [9]: df.head()

Out[9]:
```

	Project	Date	Month	Forecasted Calls	Calls Offered	Calls Handled	Calls Handled With in Threshold	Calls Abandon	ASA	Answer Time	Agent Name
0	Project A	2022-02-01	2025-02-22	13473	8393	8381	8380	12	1.689178	14157	Ali
1	Project A	2022-02-02	2025-02-22	13255	5144	5134	5096	10	2.337164	11999	Samir
2	Project A	2022-02-03	2025-02-22	13209	8450	8436	8432	14	1.874822	15816	Rania
3	Project A	2022-02-04	2025-02-22	13002	10883	10614	7376	269	51.207744	543519	Rania
4	Project A	2022-02-05	2025-02-22	12758	11445	11393	11027	52	7.235232	82431	Ahmed

Predict offered calls

```
In [19]: Relation_between_calls_offered_and_forecasted_calls=df[['Calls Offered','Forecasted Calls']]

In [22]: plt.scatter(Relation_between_calls_offered_and_forecasted_calls['Forecasted Calls'],Relation_between_calls_offered_and_forecasted_calls['Calls Offered'],color='g')
plt.xlabel("Forecasted Calls")
plt.ylabel("Calls Offered")
plt.show()
```

