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

```
df = pd.read_excel("/content/drive/My Drive/Internship/7. ANZ internship/TASK 1/ANZ synthesised tran
df.head()
```

	status	card_present_flag	bpay_biller_code	account	currency	long_lat	txn_descript
0	authorized	1.0	NaN	ACC-1598451071	AUD	153.41 -27.95	
1	authorized	0.0	NaN	ACC-1598451071	AUD	153.41 -27.95	SALES-
2	authorized	1.0	NaN	ACC-1222300524	AUD	151.23 -33.94	
3	authorized	1.0	NaN	ACC-1037050564	AUD	153.10 -27.66	SALES-
4	authorized	1.0	NaN	ACC-1598451071	AUD	153.41 -27.95	SALES-

```
df.columns
```

```
Index(['status', 'card_present_flag', 'bpay_biller_code', 'account',
       'currency', 'long_lat', 'txn_description', 'merchant_id',
       'merchant_code', 'first_name', 'balance', 'date', 'gender', 'age',
       'merchant_suburb', 'merchant_state', 'extraction', 'amount',
       'transaction_id', 'country', 'customer_id', 'merchant_long_lat',
       'movement'],
      dtype='object')
```

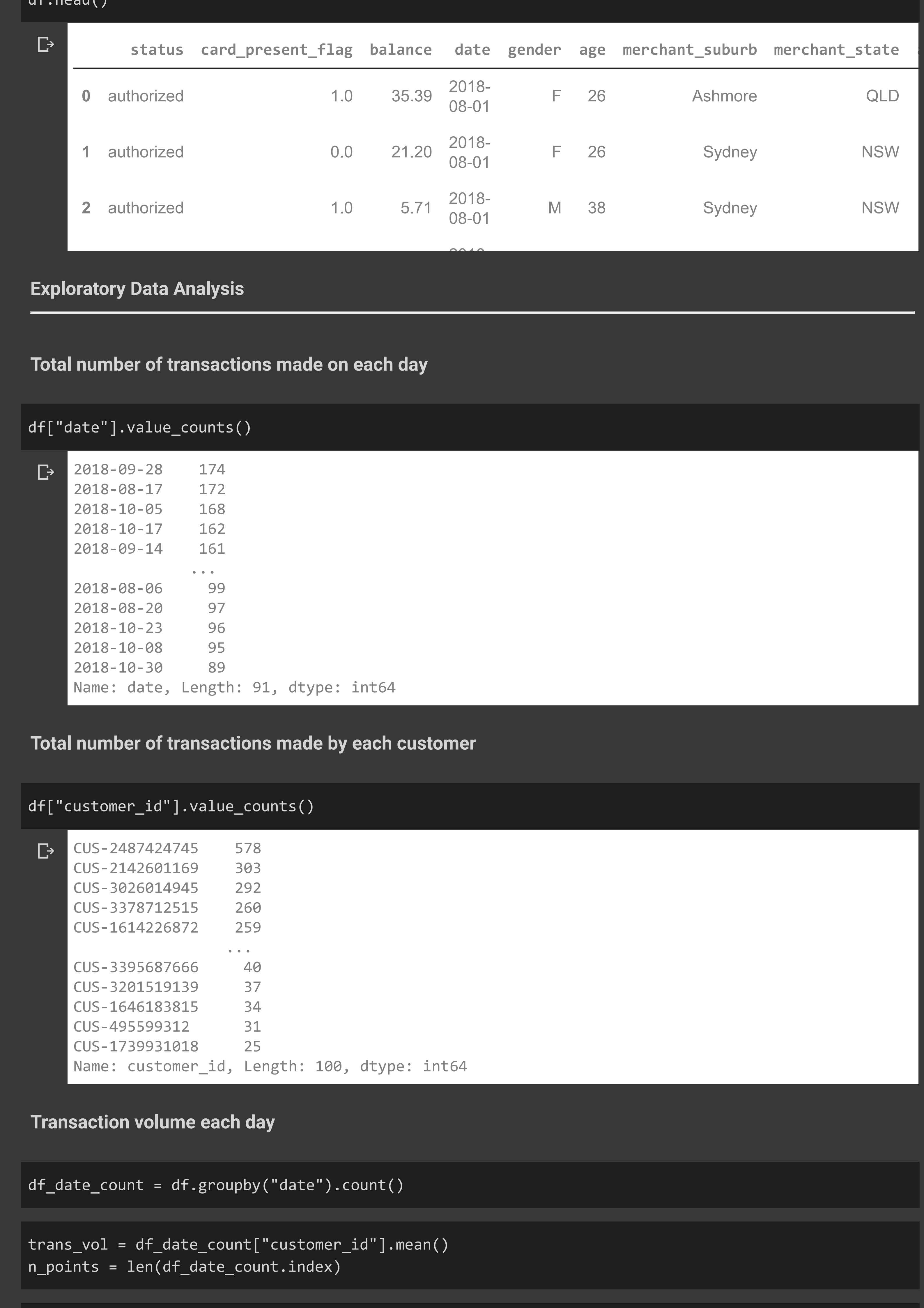
Confirming 100 unique customers exist in dataset

```
df["account"].nunique()
```

```
100
```

Dropping irrelevant features

```
df = df[["status","card_present_flag","balance","date",
                   "gender","age","merchant_suburb","merchant_state",
                   "amount","customer_id","movement"]]
df["date"] = pd.to_datetime(df["date"])
df.head()
```



```
df.head()
```

	status	card_present_flag	balance	date	gender	age	merchant_suburb	merchant_state
0	authorized	1.0	35.39	2018-08-01	F	26	Ashmore	QLD
1	authorized	0.0	21.20	2018-08-01	F	26	Sydney	NSW
2	authorized	1.0	5.71	2018-08-01	M	38	Sydney	NSW

Exploratory Data Analysis

Total number of transactions made on each day

```
df["date"].value_counts()
```

```
2018-09-28    174
2018-08-17    172
2018-10-05    168
2018-10-17    162
2018-09-14    161
             ... 
2018-08-06     99
2018-08-20     97
2018-10-23     96
2018-10-08     95
2018-10-30     89
Name: date, Length: 91, dtype: int64
```

Total number of transactions made by each customer

```
df["customer_id"].value_counts()
```

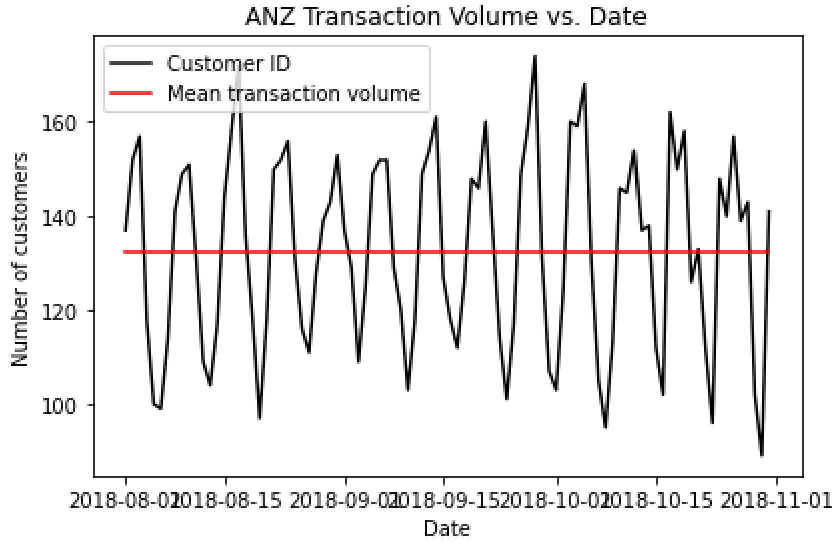
```
CUS-2487424745    578
CUS-2142601169    303
CUS-3026014945    292
CUS-3378712515    260
CUS-1614226872    259
                 ... 
CUS-3395687666     40
CUS-3201519139     37
CUS-1646183815     34
CUS-495599312      31
CUS-1739931018     25
Name: customer_id, Length: 100, dtype: int64
```

Transaction volume each day

```
df_date_count = df.groupby("date").count()
```

```
trans_vol = df_date_count["customer_id"].mean()
n_points = len(df_date_count.index)
```

```
plt.plot(df_date_count.index, df_date_count["customer_id"], c="black", label = "Customer ID")
plt.plot(df_date_count.index, np.linspace(trans_vol,trans_vol,n_points), c="r", label = "Mean transa
plt.title("ANZ Transaction Volume vs. Date")
plt.xlabel("Date")
plt.ylabel("Number of customers")
plt.legend()
plt.tight_layout()
```

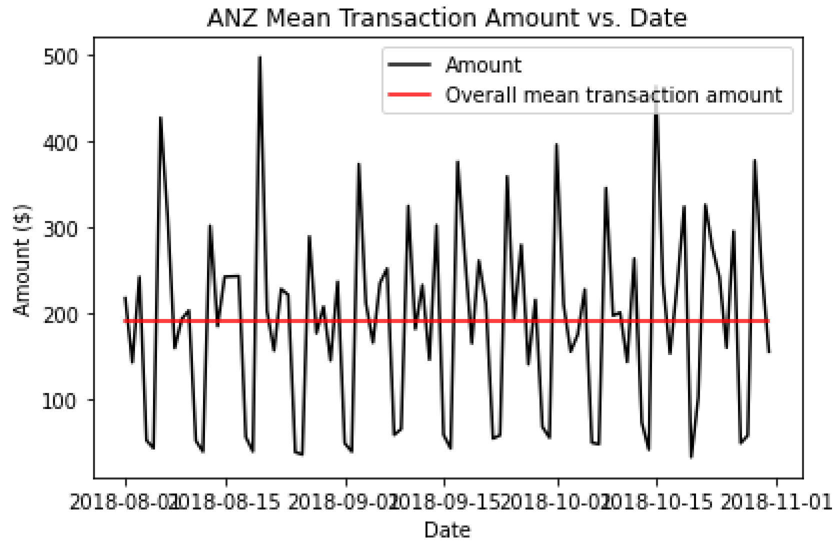


Mean transaction amount each day

```
df_date_mean = df.groupby("date").mean()
```

```
trans_amt = df_date_mean["amount"].mean()
n_points = len(df_date_count.index)
```

```
plt.figure()
plt.plot(df_date_count.index, df_date_mean["amount"], c="black", label = "Amount")
plt.plot(df_date_count.index, np.linspace(trans_amt,trans_amt,n_points), c="r", label = "Overall mea
plt.title("ANZ Mean Transaction Amount vs. Date")
plt.xlabel("Date")
plt.ylabel("Amount ($)")
plt.legend()
plt.tight_layout()
```



```
months = []
for date in df["date"]:
    if date.month == 8:
        months.append("August")
    elif date.month == 9:
        months.append("September")
    elif date.month == 10:
        months.append("October")

df["Months"] = months
df["Months"].head()
```

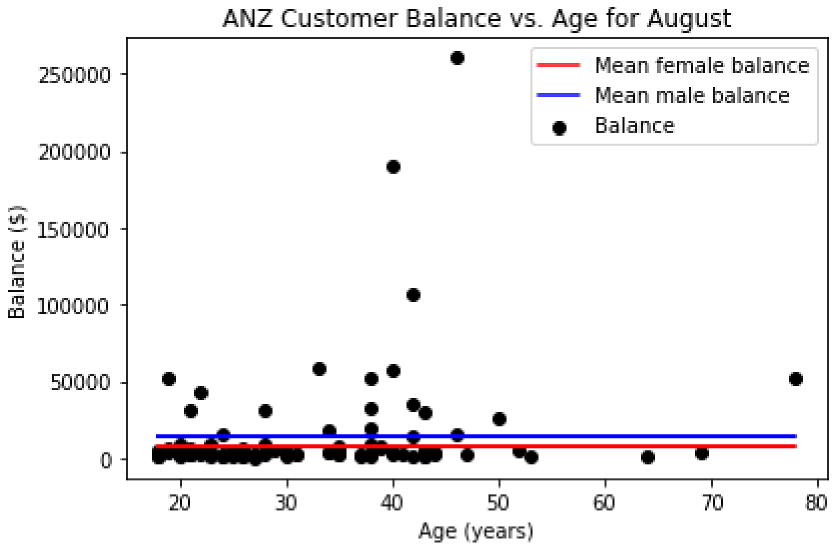
```
0    August
1    August
2    August
3    August
4    August
Name: Months, dtype: object
```

Mean customer balance and payment amount by age

```
df_cus_aug = df[df["Months"] == "August"].groupby("customer_id").mean()
df_gen_aug = df[df["Months"] == "August"].groupby("gender").mean()
```

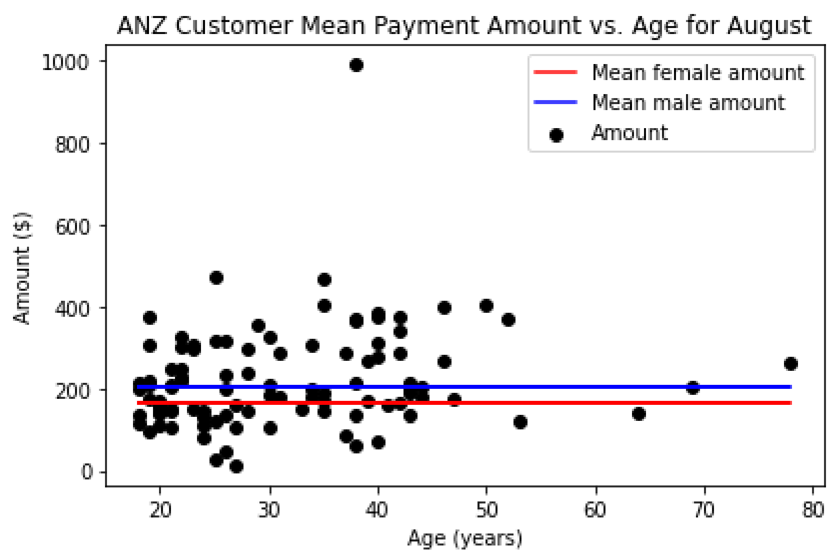
```
mean_f_bal_aug = df_gen_aug["balance"].iloc[0]
mean_m_bal_aug = df_gen_aug["balance"].iloc[1]
n_points = len(df_cus_aug["age"])
```

```
plt.figure()
plt.scatter(df_cus_aug["age"], df_cus_aug["balance"], c="black", label="Balance")
plt.plot(df_cus_aug["age"], np.linspace(mean_f_bal_aug,mean_f_bal_aug,n_points), c="r", label = "Mea
plt.plot(df_cus_aug["age"], np.linspace(mean_m_bal_aug,mean_m_bal_aug,n_points), c="b", label = "Mea
plt.title("ANZ Customer Balance vs. Age for August")
plt.xlabel("Age (years)")
plt.ylabel("Balance ($)")
plt.legend()
plt.tight_layout()
```



```
mean_f_amt_aug = df_gen_aug["amount"].iloc[0]
mean_m_amt_aug = df_gen_aug["amount"].iloc[1]
```

```
plt.scatter(df_cus_aug["age"], df_cus_aug["amount"], c="black", label="Amount")
plt.plot(df_cus_aug["age"], np.linspace(mean_f_amt_aug,mean_f_amt_aug,n_points), c="r", label = "Mea
plt.plot(df_cus_aug["age"], np.linspace(mean_m_amt_aug,mean_m_amt_aug,n_points), c="b", label = "Mea
plt.title("ANZ Customer Mean Payment Amount vs. Age for August")
plt.xlabel("Age (years)")
plt.ylabel("Amount ($)")
plt.legend()
plt.tight_layout()
```



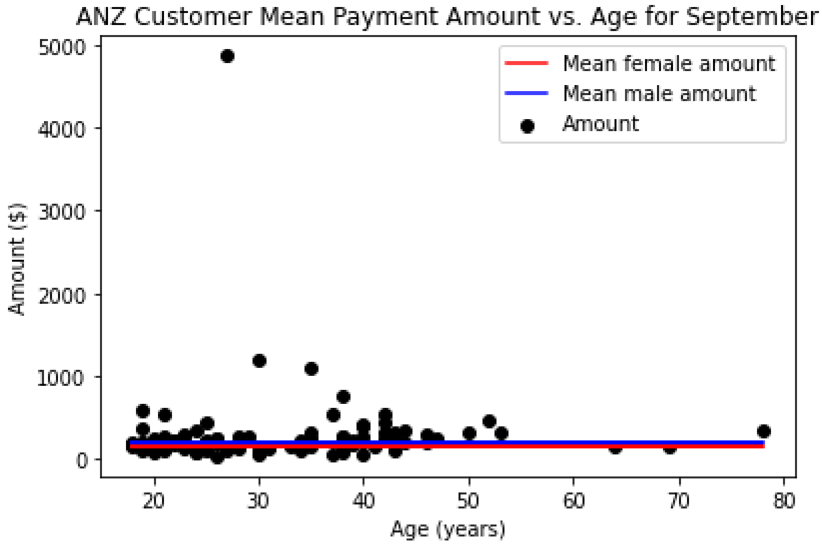
```
df_cus_sep = df[df["Months"] == "September"].groupby("customer_id").mean()
df_gen_sep = df[df["Months"] == "September"].groupby("gender").mean()
```

```
mean_f_bal_sep = df_gen_sep["balance"].iloc[0]
mean_m_bal_sep = df_gen_sep["balance"].iloc[1]
n_points = len(df_cus_sep["age"])
```

```
plt.figure()
plt.scatter(df_cus_sep["age"], df_cus_sep["balance"], c="black", label="Balance")
plt.plot(df_cus_sep["age"], np.linspace(mean_f_bal_sep,mean_f_bal_sep,n_points), c="r", label = "Mea
plt.plot(df_cus_sep["age"], np.linspace(mean_m_bal_sep,mean_m_bal_sep,n_points), c="b", label = "Mea
plt.title("ANZ Customer Balance vs. Age for September")
plt.xlabel("Age (years)")
plt.ylabel("Balance ($)")
plt.legend()
plt.tight_layout()
```

```
mean_f_amt_sep = df_gen_sep["amount"].iloc[0]
mean_m_amt_sep = df_gen_sep["amount"].iloc[1]
```

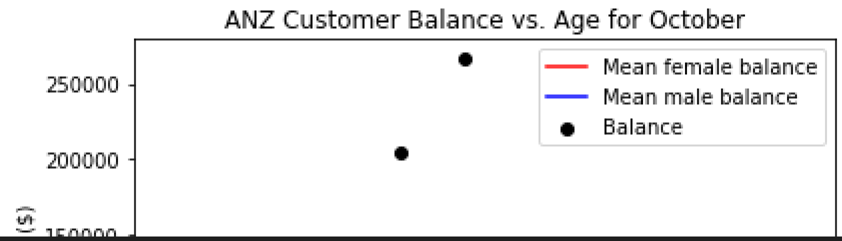
```
plt.scatter(df_cus_sep["age"], df_cus_sep["amount"], c="black", label="Amount")
plt.plot(df_cus_sep["age"], np.linspace(mean_f_amt_sep,mean_f_amt_sep,n_points), c="r", label = "Mea
plt.plot(df_cus_sep["age"], np.linspace(mean_m_amt_sep,mean_m_amt_sep,n_points), c="b", label = "Mea
plt.title("ANZ Customer Mean Payment Amount vs. Age for September")
plt.xlabel("Age (years)")
plt.ylabel("Amount ($)")
plt.legend()
plt.tight_layout()
```



```
df_cus_oct = df[df["Months"] == "October"].groupby("customer_id").mean()
df_gen_oct = df[df["Months"] == "October"].groupby("gender").mean()
```

```
mean_f_bal_oct = df_gen_oct["balance"].iloc[0]
mean_m_bal_oct = df_gen_oct["balance"].iloc[1]
n_points = len(df_cus_oct["age"])
```

```
plt.figure()
plt.scatter(df_cus_oct["age"], df_cus_oct["balance"], c="black", label="Balance")
plt.plot(df_cus_oct["age"], np.linspace(mean_f_bal_oct,mean_f_bal_oct,n_points), c="r", label = "Mea
plt.plot(df_cus_oct["age"], np.linspace(mean_m_bal_oct,mean_m_bal_oct,n_points), c="b", label = "Mea
plt.title("ANZ Customer Balance vs. Age for October")
plt.xlabel("Age (years)")
plt.ylabel("Balance ($)")
plt.legend()
plt.tight_layout()
```



```
mean_f_amt_oct = df_gen_oct["amount"].iloc[0]
mean_m_amt_oct = df_gen_oct["amount"].iloc[1]
```

plt.scatter(df_cus_oct["age"], df_cus_oct["amount"], c="black", label="Amount") plt.plot(df_cus_oct["age"], np.linspace(mean_f_amt_oct,mean_f_amt_oct,n_points), c="r", label = "Mean female amount") plt.plot(df_cus_oct["age"], np.linspace(mean_m_amt_oct,mean_m_amt_oct,n_points), c="b", label = "Mean male amount") plt.title("ANZ Customer Mean Payment Amount vs. Age for October") plt.xlabel("Age (years)") plt.ylabel("Amount ($)") plt.legend() plt.tight_layout()