In [ ]:
```
import sqlite3
from sqlite3 import Error
import pandas as pd
import seaborn as sns
import matplotlib.pyplot as plt
import numpy as np
```

In [ ]:
```
connection=sqlite3.connect('chinook.db')
```

In [ ]:
```
def create_connection(path):
    connection=None
    try:
        connection=sqlite3.connect(path)
        print('Connection to DB succesful!')
    except Error as e:
        print(f"The error '{e}' occured.")
    return connection
```

In [ ]:
```
create_connection('chinook.db')
```

Out[ ]:
```
Connection to DB succesful!
<sqlite3.Connection at 0x2334f6c1120>
```

In [ ]:
```
def execute_read_query(connection, query):
    cursor = connection.cursor()
    result = None
    try:
        cursor.execute(query)
        result=cursor.fetchall()
        return result
    except Error as e:
        print(f"The Error '{e}' occurred.")
```

2.1

In [ ]:
```
q1='''
    SELECT employees.EmployeeId, employees.FirstName, employees.LastName, COUNT(custo
    FROM employees JOIN customers ON employees.EmployeeId= customers.SupportRepId JO
    GROUP BY employees.EmployeeId, employees.FirstName, employees.LastName
    ORDER BY 4 DESC
'''


out1= execute_read_query(connection, q1)
out1
```

Out[ ]:
```
[(3, 'Jane', 'Peacock', 146, 833.0400000000013),
 (4, 'Margaret', 'Park', 140, 775.4000000000011),
 (5, 'Steve', 'Johnson', 126, 720.160000000001)]
```

In [ ]:
```
name_df= pd.DataFrame(data = out1, columns=['EmployeeId','FirstName','LastName','Tot
name_df
```

Out[ ]:

	EmployeeId	FirstName	LastName	Total_Transaction	Total
0	3	Jane	Peacock	146	833.04
1	4	Margaret	Park	140	775.40
2	5	Steve	Johnson	126	720.16

ANS: We are promoting Jane Peacock because she has the highest total transaction and sale.

2.2

In [ ]:
```
q2='''
    SELECT invoices.CustomerId, invoices.InvoiceDate
    FROM invoices
    ORDER BY 1
'''

out2= execute_read_query(connection, q2)
#out2
```

In [ ]:
```
df1= pd.DataFrame(data = out2, columns=['CustomerId','Invoicesdate'])
#df1[0:5]
```

In [ ]:
```
df1.dtypes
```

Out[ ]:
```
CustomerId       int64
Invoicesdate    object
dtype: object
```

In [ ]:
```
df1['Invoicesdate'] = pd.to_datetime(df1['Invoicesdate'])
```

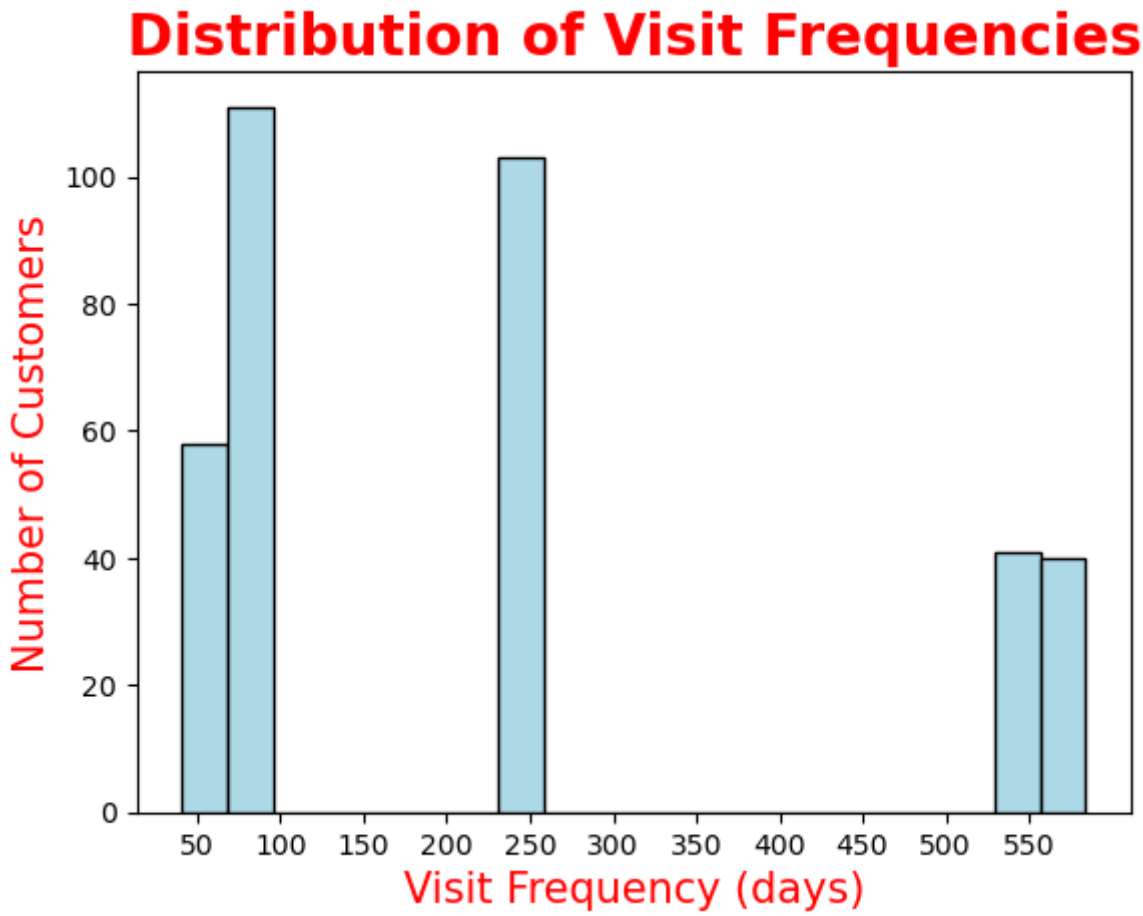
In [ ]:
```
df1['VisitFrequency'] = df1.groupby('CustomerId')['Invoicesdate'].diff().dt.days
```

In [ ]:
```
df1.head()
```

Out[ ]:

	CustomerId	Invoicesdate	VisitFrequency
0	1	2010-03-11	NaN
1	1	2010-06-13	94.0
2	1	2010-09-15	94.0
3	1	2011-05-06	233.0
4	1	2012-10-27	540.0

In [ ]:
```
#2.2
plt.hist(df1['VisitFrequency'], bins=20, color='lightblue', edgecolor='black')
plt.title('Distribution of Visit Frequencies', fontsize=20, color='red', weight='bol
plt.xlabel('Visit Frequency (days)', fontsize=15, color='red')
plt.ylabel('Number of Customers', fontsize=15, color='red')
plt.xticks(np.arange(50, 600, 50))
plt.show()
```



2.3

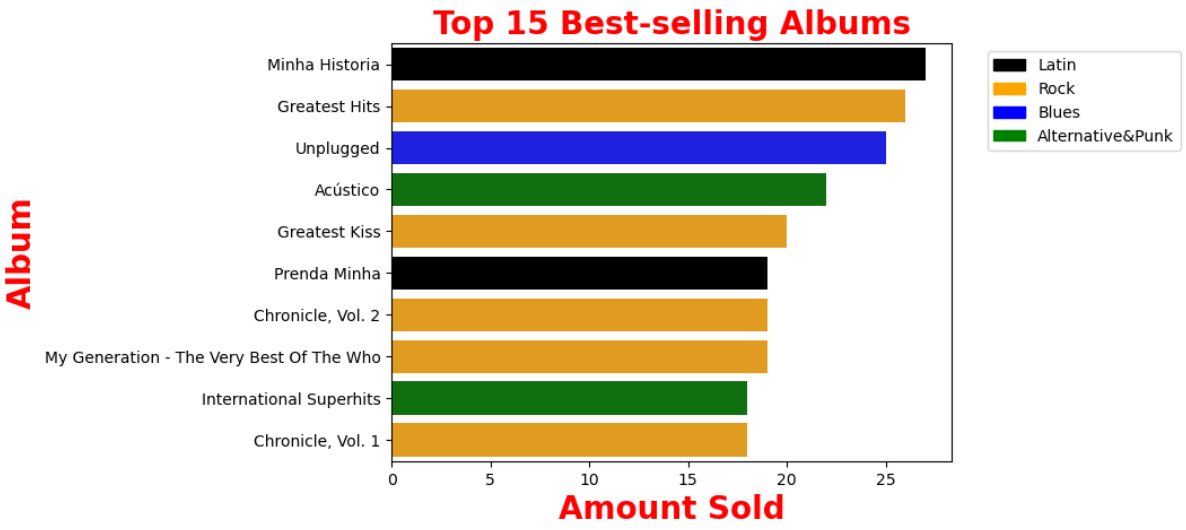
In [ ]:
```
q3='''
    SELECT albums.Title AS Albumn_Title ,artists.Name AS Artist,genres.Name AS Genre,
FROM invoice_items JOIN tracks ON invoice_items.TrackId=tracks.TrackId JOIN genres ON
ON tracks.AlbumId=albums.AlbumId JOIN artists ON artists.ArtistId=albums.ArtistId
GROUP BY albums.AlbumId ORDER BY 4 DESC;
'''


out3= execute_read_query(connection, q3)
#out3
```

In [ ]:
```
df3= pd.DataFrame(data = out3, columns=['Album', 'Artist', 'Genre', 'Amount Sold'])
df5 = df3.head(50)
df6 = df5.groupby(['Genre']).sum()
df6s = df6.sort_values(by='Amount Sold', ascending = False)
```

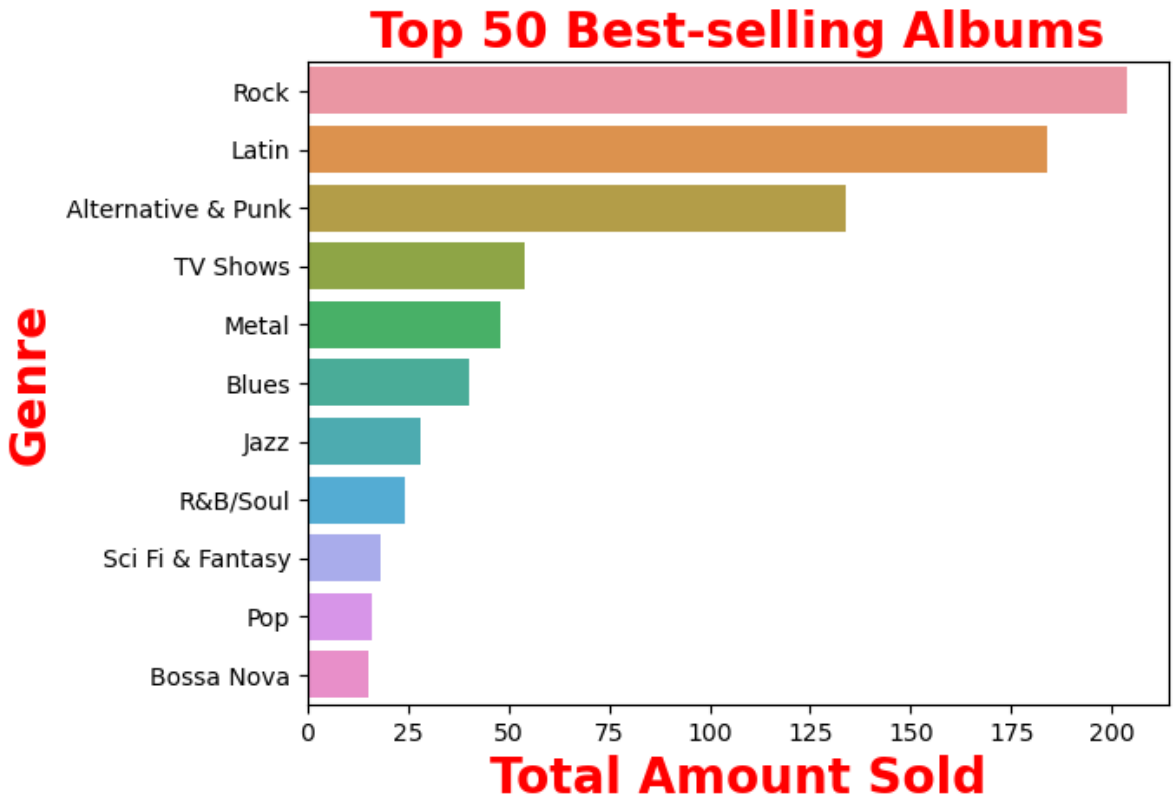
In [ ]:
```
df7 = df5.head(10)
c = ['black', 'orange', 'blue', 'green', 'orange', 'black', 'orange','orange', 'gree
r = {'fontsize': 20, 'weight': 'bold', 'color': 'red'}
sns.barplot(x=df7['Amount Sold'], y=df7['Album'], data=df7, palette=c)
legend_labels = ['Latin', 'Rock', 'Blues', 'Alternative&Punk']
handles = [plt.Rectangle((0,0),1,1, color=color) for color in c]
plt.legend(handles, legend_labels, bbox_to_anchor=(1.05, 1), loc='upper left')
plt.title('Top 15 Best-selling Albums', fontdict = r)
plt.ylabel('Album', fontdict = r)
plt.xlabel('Amount Sold', fontdict = r)
```

Out[ ]:
```
Text(0.5, 0, 'Amount Sold')
```



In [ ]:
```
sns.barplot(x=df6s['Amount Sold'], y=df6s.index, data=df6s, orient='h')
plt.title('Top 50 Best-selling Albums', fontdict = r)
plt.ylabel('Genre', fontdict = r)
plt.xlabel('Total Amount Sold', fontdict = r)
```

Out[ ]:
```
Text(0.5, 0, 'Total Amount Sold')
```



In [ ]:
```
#2.3 Most popular genre for top 50 best-selling albums
df8 = df3.groupby(['Genre']).sum()
df8s = df8.sort_values(by='Amount Sold', ascending = False)
df8s
```

Out[ ]:

Genre	Amount Sold
Rock	847
Latin	373
Metal	260
Alternative & Punk	244
Jazz	80
TV Shows	75
Blues	74
Classical	41
R&B/Soul	41
Pop	28
Reggae	24
Soundtrack	20
Drama	18
Sci Fi & Fantasy	18
Hip Hop/Rap	17
Bossa Nova	15
Alternative	14
World	13
Electronica/Dance	12
Heavy Metal	10
Easy Listening	10
Rock And Roll	6

2.4

In [ ]:
```
q4='''
    With CTE as (SELECT c.FirstName, c.LastName, C.Address, c.Phone, c.Email, SUM(i.
dense_rank() OVER (ORDER BY SUM(i.total) DESC) As spending_rank
FROM customers c
JOIN invoices i ON c.CustomerId=i.CustomerId
GROUP BY c.CustomerId
ORDER BY spending_rank)
SELECT * FROM CTE
WHERE spending_rank=2 OR spending_rank=3 OR spending_rank=5 OR spending_rank=8 OR sp

'''


out4= execute_read_query(connection, q4)
```

In [ ]:
```
#2.4
df4= pd.DataFrame(data = out4, columns=['FirstName','LastName', 'Address', 'Phone',
```

```
df4
```

Out[ ]:

	FirstName	LastName	Address	Phone	Email	Total_amount	Spendi
0	Richard	Cunningham	2211 W Berry Street	+1 (817) 924-7272	ricunningham@hotmail.com	47.62	
1	Luis	Rojas	Calle Lira, 198	+56 (0)2 635 4444	luisrojas@yahoo.cl	46.62	
2	Julia	Barnett	302 S 700 E	+1 (801) 531-7272	jubarnett@gmail.com	43.62	
3	Terhi	Hämäläinen	Porthaninkatu 9	+358 09 870 2000	terhi.hamalainen@apple.fi	41.62	
4	Luís	Gonçalves	Av. Brigadeiro Faria Lima, 2170	+55 (12) 3923-5555	luisg@embraer.com.br	39.62	
5	François	Tremblay	1498 rue Bélanger	+1 (514) 721-4711	ftremblay@gmail.com	39.62	
6	Bjørn	Hansen	Ullevålsveien 14	+47 22 44 22 22	bjorn.hansen@yahoo.no	39.62	
7	Dan	Miller	541 Del Medio Avenue	+1 (650) 644-3358	dmiller@comcast.com	39.62	
8	Heather	Leacock	120 S Orange Ave	+1 (407) 999-7788	hleacock@gmail.com	39.62	
9	Wyatt	Girard	9, Place Louis Barthou	+33 05 56 96 96 96	wyatt.girard@yahoo.fr	39.62	