```
import pandas as pd
import numpy as np

import matplotlib.pyplot as plt
import seaborn as sns

from scipy import stats

plt.rcParams['figure.figsize'] = (10,6)
sns.set_style("whitegrid")
```

```
sales = pd.read_csv('/content/sales.csv')
vendor_invoice = pd.read_csv('/content/vendor_invoice.csv')
purchases = pd.read_csv('/content/purchases.csv')
purchase_prices = pd.read_csv('/content/purchase_prices.csv')
begin_inventory = pd.read_csv('/content/begin_inventory.csv')
end_inventory = pd.read_csv('/content/end_inventory.csv')
```

```
sales.head()
```

	InventoryId	Store	Brand	Description	Size	SalesQuantity	Sal
0	1_HARDERSFIELD_1004	1	1004	Jim Beam w/2 Rocks Glasses	750mL	1	
1	1_HARDERSFIELD_1004	1	1004	Jim Beam w/2 Rocks Glasses	750mL	2	
2	1_HARDERSFIELD_1004	1	1004	Jim Beam w/2 Rocks Glasses	750mL	1	
3	1_HARDERSFIELD_1004	1	1004	Jim Beam w/2 Rocks Glasses	750mL	1	
4	1_HARDERSFIELD_1005	1	1005	Maker's Mark Combo Pack	375mL 2 Pk	2	

```
sales.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 254379 entries, 0 to 254378
Data columns (total 14 columns):
 #   Column          Non-Null Count   Dtype
---  ------          --------------   -----
 0   InventoryId     254379 non-null  object
 1   Store           254379 non-null  int64
 2   Brand           254379 non-null  int64
 3   Description     254379 non-null  object
 4   Size            254379 non-null  object
 5   SalesQuantity   254379 non-null  int64
 6   SalesDollars    254379 non-null  float64
 7   SalesPrice      254379 non-null  float64
 8   SalesDate       254379 non-null  object
 9   Volume          254379 non-null  float64
 10  Classification  254379 non-null  int64
 11  ExciseTax       254379 non-null  float64
 12  VendorNo        254378 non-null  float64
 13  VendorName      254378 non-null  object
dtypes: float64(5), int64(4), object(5)
memory usage: 27.2+ MB
```

```
purchases.head()
```

	InventoryId	Store	Brand	Description	Size	VendorNumber	Ven
0	69_MOUNTMEND_8412	69	8412	Tequila Ocho Plata Fresno	750mL	105	Al E
1	30_CULCHETH_5255	30	5255	TGI Fridays Ultimte Mudslide	1.75L	4466	AM V BEV
2	34_PITMERDEN_5215	34	5215	TGI Fridays Long Island Iced	1.75L	4466	AM V BEV
3	1_HARDERSFIELD_5255	1	5255	TGI Fridays Ultimte Mudslide	1.75L	4466	AM V BEV
4	76_DONCASTER_2034	76	2034	Glendalough Double Barrel	750mL	388	AT IMP CC

```
for df in [sales, purchases, purchase_prices, begin_inventory, end_inventory,
    df.columns = df.columns.str.strip()
```

```
sales['SalesDate'] = pd.to_datetime(sales['SalesDate'])
```

```
purchase_date_cols = ['PODate', 'ReceivingDate', 'InvoiceDate', 'PayDate']
for col in purchase_date_cols:
    purchases[col] = pd.to_datetime(purchases[col])
```

```
sales.head()
```

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3	1_HARDERSFIELD_1004	1	1004	Jim Beam w/2 Rocks Glasses	750mL	1	
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```
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4	76_DONCASTER_2034	76	2034	Glendalough Double Barrel	750mL	388	AT IMP CC

```
sales['Revenue'] = sales['SalesQuantity'] * sales['SalesPrice']
```

```
sales = sales.merge(
    purchase_prices[['Brand', 'PurchasePrice']],
    on='Brand',
    how='left'
)
```

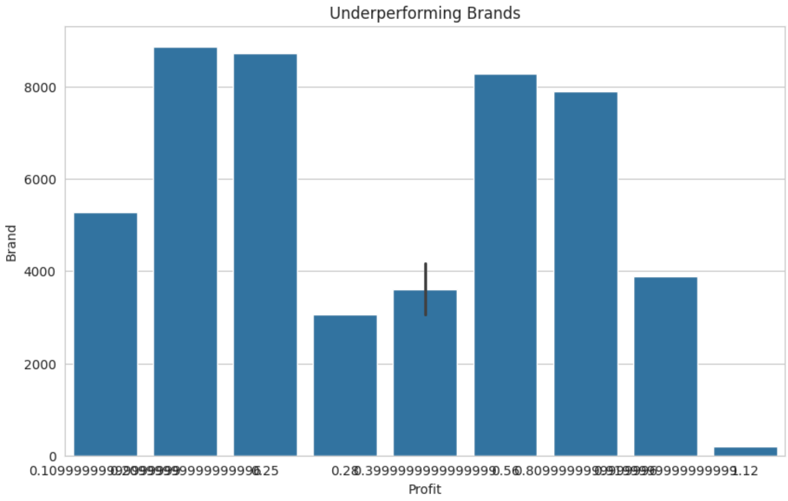
```
sales['Cost'] = sales['SalesQuantity'] * sales['PurchasePrice']
sales['Profit'] = sales['Revenue'] - sales['Cost']
sales['ProfitMargin'] = (sales['Profit'] / sales['Revenue']) * 100
```

```
brand_perf = sales.groupby('Brand').agg({
    'Revenue': 'sum',
    'Profit': 'sum',
    'ProfitMargin': 'mean'
}).reset_index()

brand_perf.sort_values('Profit').head(10)
```

	Brand	Revenue	Profit	ProfitMargin
1582	5287	0.49	0.11	22.448980
2329	8872	0.99	0.21	21.212121
2304	8729	0.99	0.25	25.252525
833	3065	0.99	0.28	28.282828
1275	4173	1.98	0.40	20.202020
827	3053	1.98	0.40	20.202020
2151	8282	1.98	0.56	28.282828
2036	7902	2.97	0.81	27.272727
1182	3888	3.96	0.92	23.232323
37	199	4.99	1.12	22.444890

```
sns.barplot(
    data=brand_perf.sort_values('Profit').head(10),
    x='Profit',
    y='Brand'
)
plt.title('Underperforming Brands')
plt.show()
```

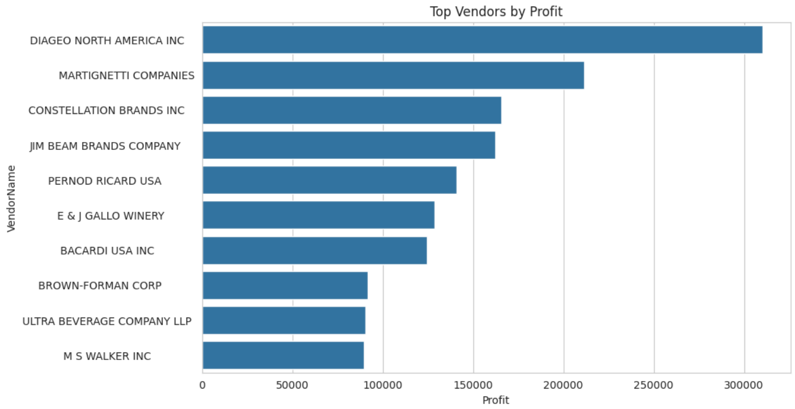


```
vendor_perf = sales.groupby('VendorName').agg({
    'Revenue': 'sum',
    'Profit': 'sum'
}).reset_index()

vendor_perf.sort_values('Profit', ascending=False).head(10)
```

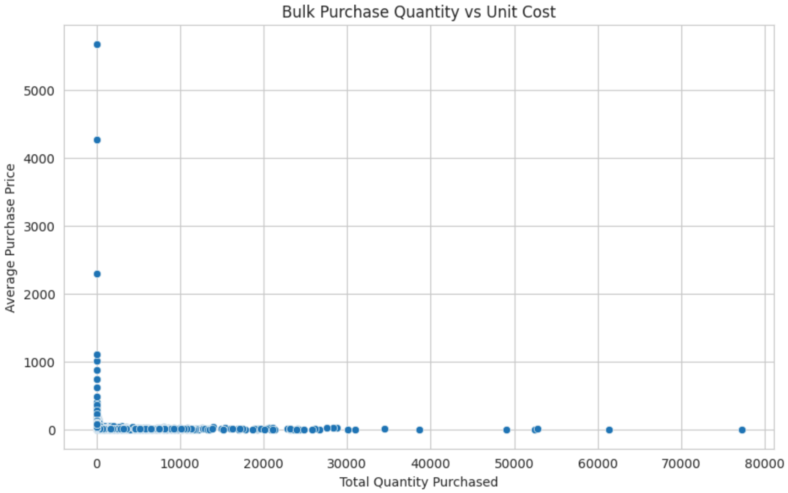
	VendorName	Revenue	Profit
20	DIAGEO NORTH AMERICA INC	1091148.78	310137.61
49	MARTIGNETTI COMPANIES	564826.15	211467.06
16	CONSTELLATION BRANDS INC	414884.54	165853.92
38	JIM BEAM BRANDS COMPANY	605731.68	162253.14
61	PERNOD RICARD USA	486729.07	141023.11
25	E & J GALLO WINERY	351822.43	128874.07
4	BACARDI USA INC	400081.85	124472.45
7	BROWN-FORMAN CORP	308595.44	91640.34
97	ULTRA BEVERAGE COMPANY LLP	271170.90	90662.06
45	M S WALKER INC	271397.97	89603.03

```
sns.barplot(
    data=vendor_perf.sort_values('Profit', ascending=False).head(10),
    x='Profit',
    y='VendorName'
)
plt.title('Top Vendors by Profit')
plt.show()
```



```
bulk_purchase = purchases.groupby('Brand').agg({
    'Quantity': 'sum',
    'PurchasePrice': 'mean'
}).reset_index()

sns.scatterplot(
    data=bulk_purchase,
    x='Quantity',
    y='PurchasePrice'
)
plt.title('Bulk Purchase Quantity vs Unit Cost')
plt.xlabel('Total Quantity Purchased')
plt.ylabel('Average Purchase Price')
plt.show()
```



```
begin_inventory.columns
```

```
Index(['InventoryId', 'Store', 'City', 'Brand', 'Description', 'Size',
       'onHand', 'Price', 'startDate'],
      dtype='object')
```

```
end_inventory.columns
```

```
Index(['InventoryId', 'Store', 'City', 'Brand', 'Description', 'Size',
       'onHand', 'Price', 'endDate'],
      dtype='object')
```

```
inventory = begin_inventory.merge(
    end_inventory,
    on=['InventoryId', 'Store', 'Brand'],
    suffixes=('_begin', '_end')
)
```

```
inventory['AverageInventory'] = (
    inventory['onHand_begin'] + inventory['onHand_end']
) / 2
```

```
sales_qty = sales.groupby('Brand')['SalesQuantity'].sum().reset_index()
```

```
inventory_turnover = sales_qty.merge(
    inventory[['Brand', 'AverageInventory']],
    on='Brand',
    how='left'
)
```

```
inventory_turnover['InventoryTurnover'] = (
    inventory_turnover['SalesQuantity'] /
    inventory_turnover['AverageInventory']
)
```

```
inventory_turnover.sort_values('InventoryTurnover').head(10)
```

	Brand	SalesQuantity	AverageInventory	InventoryTurnover
9796	1505	1	177.0	0.005650
9795	1505	1	163.5	0.006116
9794	1505	1	127.5	0.007843
9793	1505	1	107.5	0.009302
36438	3564	1	91.5	0.010929
120010	18743	1	84.0	0.011905
123108	19866	1	77.5	0.012903
166270	45871	1	72.5	0.013793
124204	20515	1	71.0	0.014085
131826	24755	1	71.0	0.014085

STEP 5: VENDOR SCORECARD (CORE BUSINESS OUTPUT)

```
sales.columns
```

```
Index(['InventoryId', 'Store', 'Brand', 'Description', 'Size',
'SalesQuantity',
       'SalesDollars', 'SalesPrice', 'SalesDate', 'Volume', 'Classification',
       'ExciseTax', 'VendorNo', 'VendorName', 'Revenue', 'PurchasePrice',
       'Cost', 'Profit', 'ProfitMargin'],
      dtype='object')
```

```
vendor_scorecard = sales.groupby(
    'VendorName'
).agg(
    Total_Sales_Qty=('SalesQuantity', 'sum'),
    Total_Revenue=('Revenue', 'sum'),
    Total_Profit=('Profit', 'sum'),
    Avg_Profit_Margin=('ProfitMargin', 'mean')
).reset_index()
```

```
vendor_scorecard.head()
```

	VendorName	Total_Sales_Qty	Total_Revenue	Total_Profit	Avg_Profit_Margi
0	ALTAMAR BRANDS LLC	7	134.93	37.01	25.43120
1	AMERICAN VINTAGE BEVERAGE	136	1766.64	491.56	27.82909
	APPOLO				

Next steps: Generate code with vendor_scorecard New interactive sheet

```
vendor_scorecard['Profit_Rank'] = vendor_scorecard['Total_Profit'].rank(ascer
```

```
vendor_scorecard.sort_values('Profit_Rank').head(10)
```

	VendorName	Total_Sales_Qty	Total_Revenue	Total_Profit	Avg_Profit_
20	DIAGEO NORTH AMERICA INC	107542	1091148.78	310137.61	27.
49	MARTIGNETTI COMPANIES	35639	564826.15	211467.06	38.
16	CONSTELLATION BRANDS INC	38394	414884.54	165853.92	39.
38	JIM BEAM BRANDS COMPANY	52712	605731.68	162253.14	26.
61	PERNOD RICARD USA	24683	486729.07	141023.11	29.
25	E & J GALLO WINERY	33651	351822.43	128874.07	36.

🧩 STEP 6: VENDOR SEGMENTATION (HIGH / MEDIUM / LOW)

```
vendor_scorecard['Total_Profit'].describe()
```

```
         Total_Profit
count      109.000000
mean     21467.092110
std      47966.379179
min          2.450000
25%        188.660000
50%        918.090000
75%      20708.860000
max     310137.610000

dtype: float64
```

```
low_cut = vendor_scorecard['Total_Profit'].quantile(0.30)
high_cut = vendor_scorecard['Total_Profit'].quantile(0.70)
```

```
def segment_vendor(profit):
    if profit >= high_cut:
        return 'High Performing'
    elif profit >= low_cut:
        return 'Medium Performing'
    else:
        return 'Low Performing'

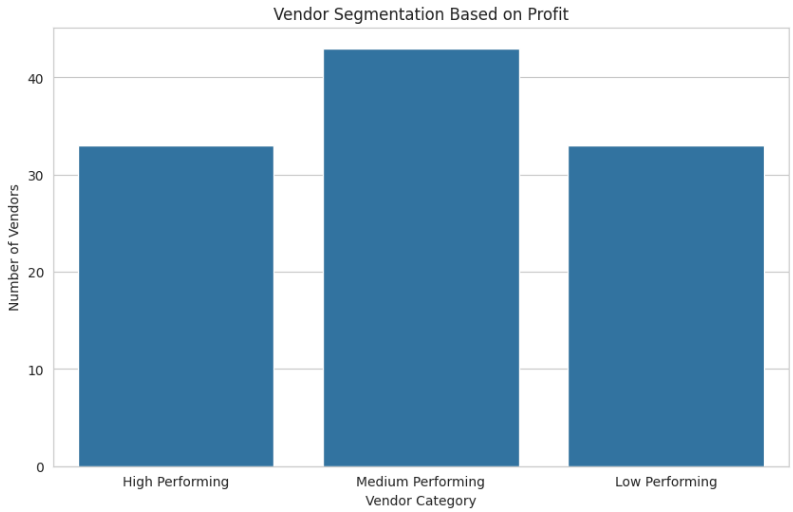
vendor_scorecard['Vendor_Category'] = vendor_scorecard['Total_Profit'].apply(
```

```
vendor_scorecard['Vendor_Category'].value_counts()
```

```
                      count
   Vendor_Category
Medium Performing       43
   Low Performing       33
  High Performing       33

dtype: int64
```

```
sns.countplot(
    data=vendor_scorecard,
    x='Vendor_Category',
    order=['High Performing', 'Medium Performing', 'Low Performing']
)
plt.title('Vendor Segmentation Based on Profit')
plt.xlabel('Vendor Category')
plt.ylabel('Number of Vendors')
plt.show()
```



📊 STEP 7: MANAGEMENT INSIGHTS

```
vendor_scorecard.sort_values('Total_Profit', ascending=False).head(10)
```

	VendorName	Total_Sales_Qty	Total_Revenue	Total_Profit	Avg_Profit_
20	DIAGEO NORTH AMERICA INC	107542	1091148.78	310137.61	27.