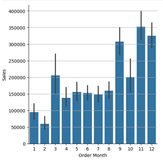
1. Monthly Sales Analysis

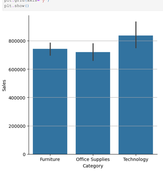
In [123]:
```
sns.catplot(x="Order Month",y="Sales",data=df,kind="bar",estimator=np.sum)
plt.grid(axis='y')
plt.show()
```



November (11nth) month had highest sales and Febrauary (2ND) month had lowest sales

2. Product Category Sales Analysis

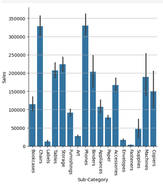
In [124]:
```
sns.catplot(x="Category",y="Sales",data=df,kind="bar",estimator=np.sum)
plt.grid(axis='y')
plt.show()
```



Technology category had highest sales and Office supplies category had lowest sales

3. Product Sub-Category' Sales Analysis

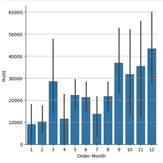
In [127]:
```
sns.catplot(x="Sub-Category",y="Sales",data=df,kind="bar",estimator=np.sum)
plt.grid(axis='y')
plt.xticks(rotation=270)
plt.show()
```



Phones sub-category had highest sales and Fasteners sub-category had lowest sales

4. Monthly Profit Analysis

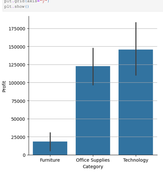
In [128]:
```
sns.catplot(x="Order Month",y="Profit",data=df,kind="bar",estimator=np.sum)
plt.grid(axis='y')
plt.show()
```



December (12 th) month had highest Profit and January (1st) month had lowest Profit

5. Product Category Profit Analysis

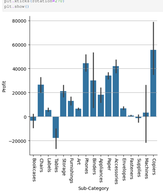
In [129]:
```
sns.catplot(x="Category",y="Profit",data=df,kind="bar",estimator=np.sum)
plt.grid(axis='y')
plt.show()
```



Technology category had highest Profit and Furniture category had lowest Profit

6. Product Sub-Category Profit Analysis

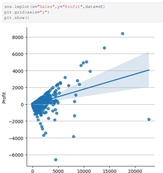
In [130]:
```
sns.catplot(x="Sub-Category",y="Profit",data=df,kind="bar",estimator=np.sum)
plt.grid(axis='y')
plt.xticks(rotation=270)
plt.show()
```



Copiers sub-category had highest Profit and Tables sub-category had lowest Profit

7. Sales and Profit Analysis

In [131]:
```
sns.lmplot(x="Sales",y="Profit",data=df)
plt.grid(axis='y')
plt.show()
```



In [132]:
```
# Calculate correlation between Sales and Profit
correlation = df['Sales'].corr(df['Profit'])
print("Correlation between Sales and Profit:", correlation)
```

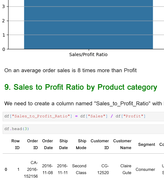
```
Correlation between Sales and Profit: 0.479364397377061
```

Since 0.479 falls between 0.4 and 0.6, it suggests a moderate positive correlation—meaning that as Sales increase, Profit tends to increase, but the relationship is not very strong.

8. Sales to Profit Ratio

In [133]:
```
# Calculate the ratio of the sum of Sales to the sum of Profit
ratio = df['Sales'].sum() / df['Profit'].sum()

# Create a DataFrame for the calculated ratio
sns.barplot(x='Sales/Profit Ratio', y=ratio)
plt.grid(axis='y')
plt.show()
```



On an average order sales is 8 times more than Profit

9. Sales to Profit Ratio by Product category

We need to create a column named "Sales_to_Profit_Ratio" with logic df["Sales"].sum() / df["Profit"].sum()

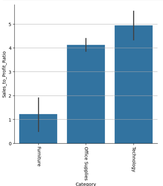
In [134]:
```
df['Sales_to_Profit_Ratio'] = df['Sales'] / df['Profit']
```

In [135]:
```
df.head(3)
```

Out[135]:

	Row ID	Order ID	Order Date	Ship Date	Ship Mode	Customer ID	Customer Name	Segment	Country	City	State	Postal Code	Region	Product ID	Category	Sub-Category	Product Name	Sales	Quantity	Discount	Profit	Order Day	Order Month	Order Year	Sa
0	1	CA-2016-152156	2016-11-08	2016-11-11	Second Class	CG-12520	Claire Gute	Consumer	United States	Henderson	Kentucky	42420	South	FUR-BO-10001798	Furniture	Bookcases	Bush Somerset Collection Bookcase	261.96	2	0.0	41.9136	8	11	2016	
1	2	CA-2016-152156	2016-11-08	2016-11-11	Second Class	CG-12520	Claire Gute	Consumer	United States	Henderson	Kentucky	42420	South	FUR-CH-10000454	Furniture	Chairs	Hon Deluxe Fabric Upholstered Stacking Chairs,...	731.94	3	0.0	219.5820	8	11	2016	
2	3	CA-2016-138688	2016-06-12	2016-06-16	Second Class	DV-13045	Darrin Van Huff	Corporate	United States	Los Angeles	California	90036	West	OFF-LA-10002246	Office Supplies	Labels	Self-Adhesive Address Labels for Typewriters b...	14.62	2	0.0	6.8714	12	6	2016	

In [136]:
```
sns.catplot(x="Sales_to_Profit_Ratio",data=df,kind="bar",estimator=np.mean)
plt.grid(axis='y')
plt.xticks(rotation=270)
plt.show()
```

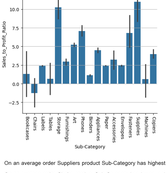


On an average order Technology product category has highest sales to profit ratio

On an average order Furniture product category has lowest sales to profit ratio

10. Sales to Profit Ratio by Product Sub-Category

In [137]:
```
sns.catplot(x="Sub-Category",y="Sales_to_Profit_Ratio",data=df,kind="bar",estimator=np.mean)
plt.grid(axis='y')
plt.xticks(rotation=270)
plt.show()
```



On an average order Suppliers product Sub-Category has highest sales to profit ratio

On an average order Chairs product Sub-Category has lowest sales to profit ratio

END