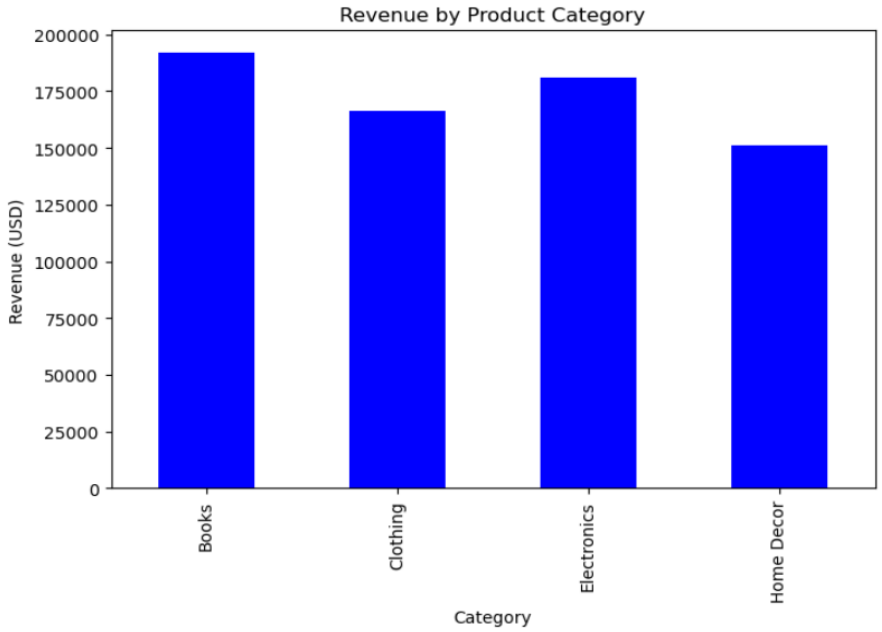
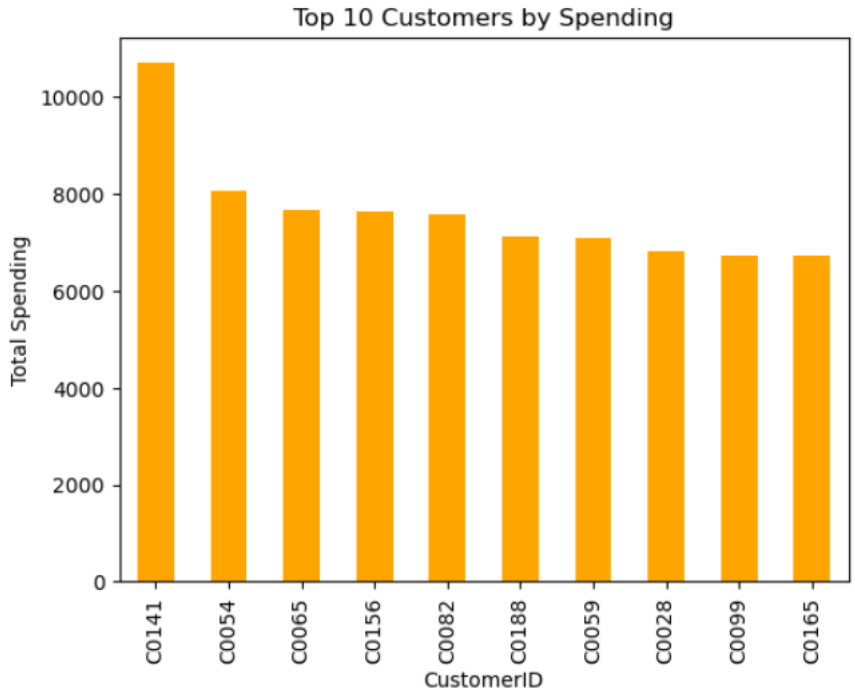
```
In [11]: category_revenue = transactions.merge(products, on="ProductID").groupby('Category')['TotalValue'].sum()
         category_revenue.plot(kind='bar', color='blue', figsize=(8, 5), title='Revenue by Product Category')
         plt.ylabel("Revenue (USD)")
         plt.xlabel("Category")
         plt.show()
```



Product Categories:
Books generates the highest revenue, while home décor struggles.

- Offer special discounts or "Buy One, Get One" deals specifically for products in low-performing categories.
- Use customer purchase history to recommend low-performing products as complementary items during checkout.
- Offer subscription boxes that include products from low-performing categories, giving customers a chance to try them regularly.

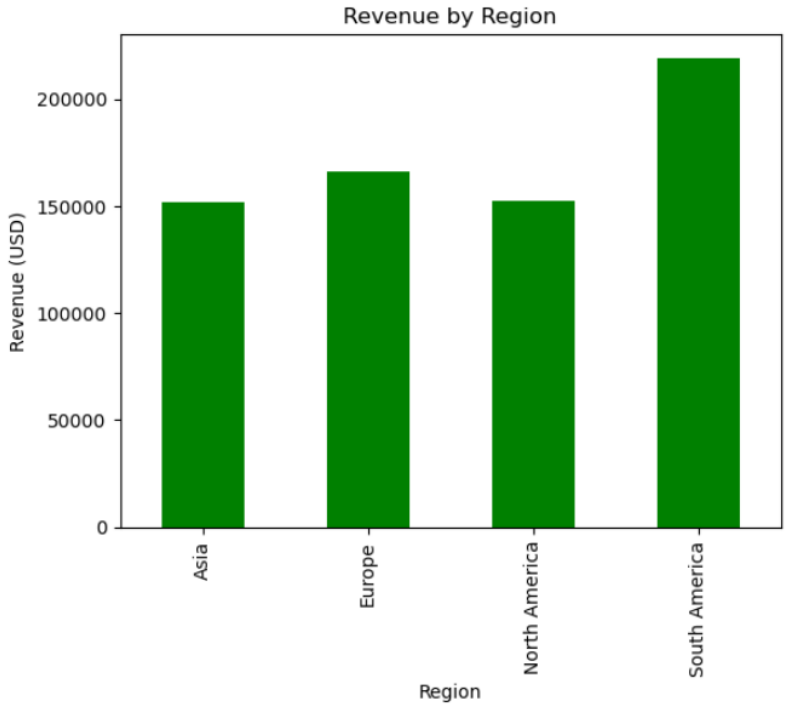
```
Top 10 Customers by Total Spending:
 CustomerID
C0141    10673.87
C0054     8040.39
C0065     7663.70
C0156     7634.45
C0082     7572.91
C0188     7111.32
C0059     7073.28
C0028     6819.57
C0099     6715.72
C0165     6708.10
Name: TotalValue, dtype: float64
```



Top Customers:
Top 10 customers account for maximum total revenue generated, with the highest spender generating more than $10,000. Suggest loyalty programs for the customers.

- Customers earn points for every purchase, which can be redeemed for discounts, free products, or exclusive items.
- Offer VIP benefits like free upgrades, priority customer service, or invitations to exclusive events for top-spending customers.
- Offer a paid loyalty program with guaranteed perks like monthly discounts, free shipping, or cashback on every purchase.

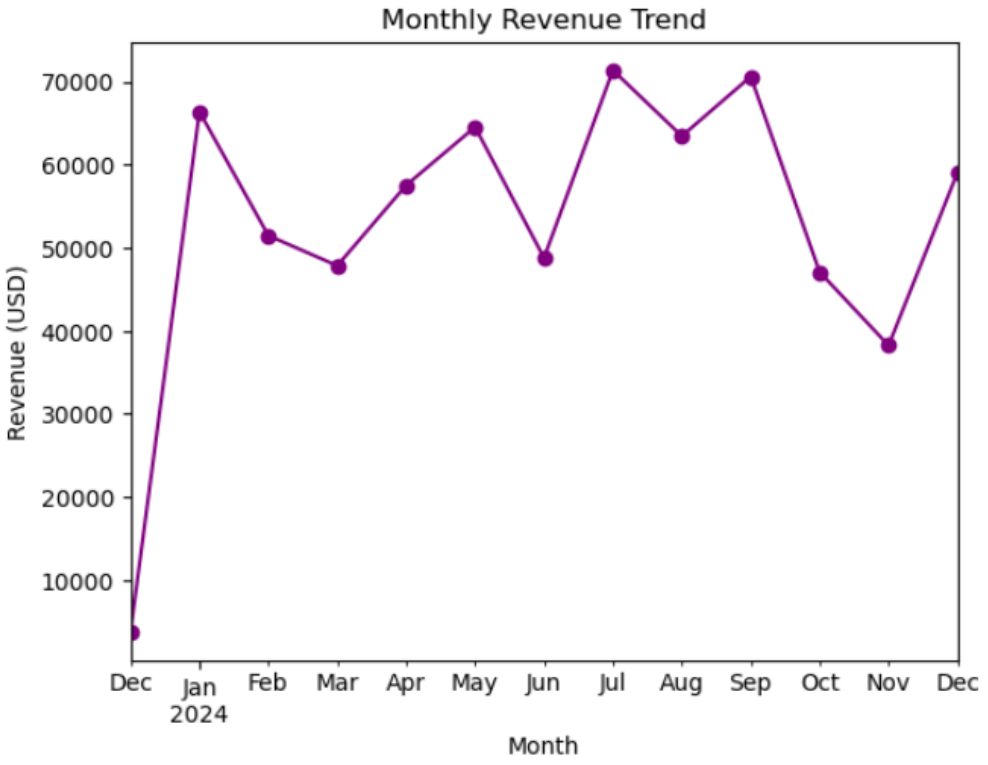
In [11]:
```
#Revenue by Region
region_revenue = transactions.merge(customers,on="CustomerID").groupby('Region')['TotalValue'].sum()
region_revenue.plot(kind='bar',title='Revenue by Region',color='green')
plt.ylabel("Revenue (USD)")
plt.show()
```



Regional Revenue Performance:
The highest revenue is generated from Asia, while South America underperforms. Suggested targeted promotions and better inventory in low-performing regions.

- Offer exclusive discounts tailored to customers in low-performing regions. For example, "10% off for all orders in South America."
- Organize limited-time flash sales to boost purchases in underperforming areas.
- Align promotions with local festivals or holidays in the region to encourage more purchases.

In [12]:
```
#Monthly Revenue Trend
transactions['Month']=transactions['TransactionDate'].dt.to_period('M')
monthly_revenue=transactions.groupby('Month')['TotalValue'].sum()
monthly_revenue.plot(marker='o',title='Monthly Revenue Trend',color='purple')
plt.ylabel("Revenue (USD)")
plt.xlabel("Month")
plt.show()
```



Seasonal Trends:
Revenue peaks in January,May,July,September. Recommend stocking up and running campaigns during high-demand periods.

- Analyze past sales data to identify high-demand seasons (e.g., "Electronics sales peak in November-December due to holiday shopping"). Ensure adequate stock before these periods.
- If certain products (like winter clothing) sell more in specific months, adjust inventory accordingly in regions where demand is highest.
- Use predictive analytics to estimate demand and automate restocking based on trends in product sales and customer behavior.