Customer & Product Behaviour Analysis
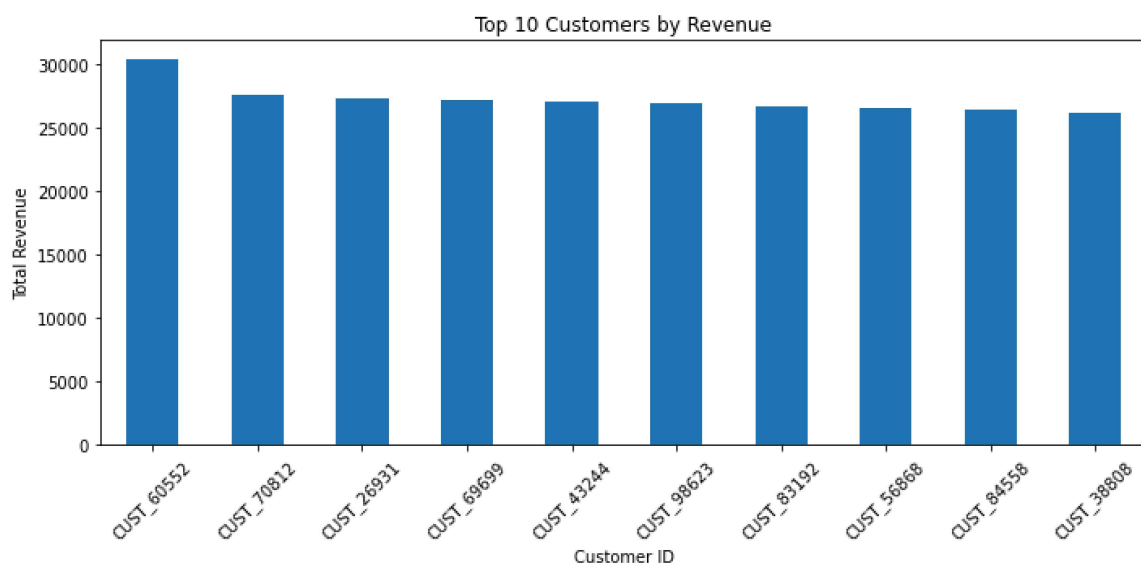
Goal: Understand customer engagement, loyalty, and product perormance to support segmentation and targeting.

1. Top Customers by Total Revenue

In [58]:
```python
top_customers = df.groupby('Customer ID')['Total Revenue'].sum().sort_v

top_customers.plot(kind='bar', title='Top 10 Customers by Revenue', fig
plt.ylabel('Total Revenue')
plt.xticks(rotation=45)
plt.tight_layout()
plt.show()
```


### 2. One-Time vs Repeat Customers

In [59]:
```python
order_counts = df.groupby('Customer ID').size()
repeat_customers = (order_counts > 1).sum()
one_time_customers = (order_counts == 1).sum()

print(f"Repeat Customers:{repeat_customers}")
print(f"One-Time Customers:{one_time_customers}")
```

```
Repeat Customers:95101
One-Time Customers:3247
```

3. Product Popularity by Quantity and Revenue

```
In [90]:     1  product_summary = df.groupby(['Product ID', 'Category']).agg({'Quantity
             2
             3  top_products_by_quantity = product_summary.sort_values(by='Quantity', a
             4  top_products_by_revenue = product_summary.sort_values(by='Total Revenue
             5
             6  # Plot by Quantity
             7  top_products_by_quantity.plot(x='Product ID', y='Quantity', kind='bar',
             8                              title='Top 10#Products by Quantity Sold')
             9  plt.xticks(rotation=45)
            10  plt.tight_layout()
            11  plt.show()
            12
            13  # Plot by Revenue
            14  top_products_by_revenue.plot(x='Product ID', y='Total Revenue', kind='b
            15                              title='Top 10 Products by Revenue')
            16  plt.xticks(rotation=45)
            17  plt.tight_layout()
            18  plt.show()
```

Top 10 Products by Quantity Sold

Top 10 Products by Revenue
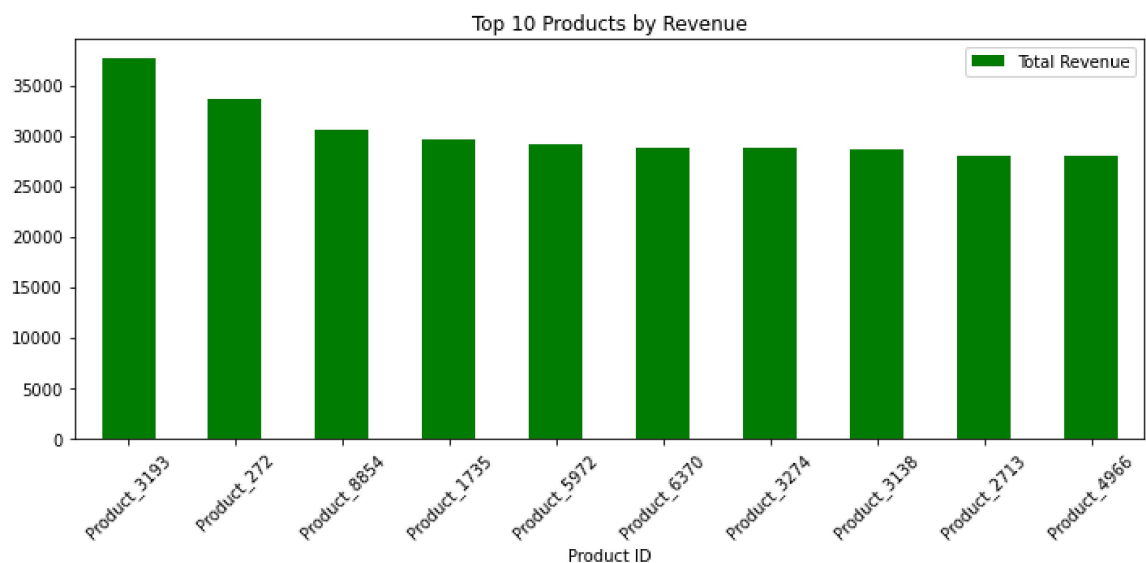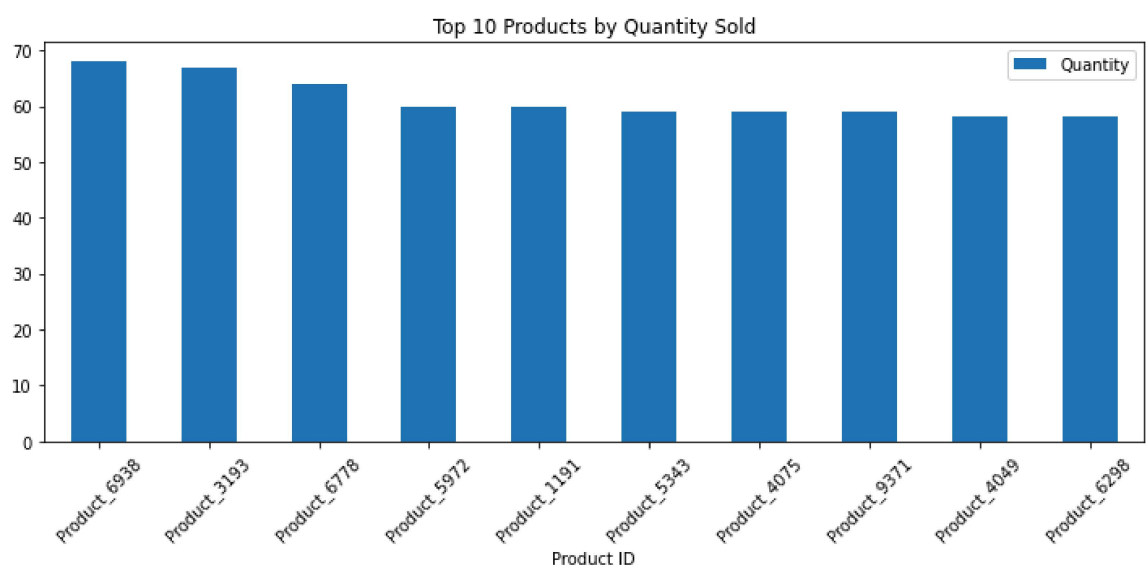
4. Revenue by Category

In [75]:
```python
category_revenue = df.groupby('Category')['Total Revenue'].sum().sort_v
category_revenue.plot(kind='bar', title='Revenue by Category', figsize=
plt.ylabel('Total Revenue')
plt.xticks(rotation=45)
for i, v in enumerate(category_revenue):
    plt.text(i, v, str(round(v, 2)), color='black', ha='center', va='bo
plt.tight_layout()
plt.show()
```