```python
import pandas as pd
import numpy as np
import seaborn as sns
import matplotlib.pyplot as plt
students = pd.DataFrame({'student_id': [1, 2, 3], 'name': ['Alice', 'Bob', 'Charlie']})
grades = pd.DataFrame({'student_id': [1, 3], 'score': [85, 90]})

merged_df = pd.merge(students, grades, on='student_id', how='inner')
print(merged_df)
```

```
       student_id     name  score
    0           1    Alice     85
    1           3  Charlie     90
```

```python
employees = pd.DataFrame({'employee_id': [1, 2], 'department_id': [101, 102]})
departments = pd.DataFrame({'department_id': [101, 102, 103], 'department_name': ['HR', 'Sales', 'IT']})

merged_df = pd.merge(employees, departments, on='department_id', how='right')
print(merged_df)
```

```
       employee_id  department_id department_name
    0          1.0            101              HR
    1          2.0            102           Sales
    2          NaN            103              IT
```

```python
spring = pd.DataFrame({'student': ['Anna'], 'term': ['Spring']})
summer = pd.DataFrame({'student': ['Ben'], 'term': ['Summer']})
fall = pd.DataFrame({'student': ['Cara'], 'term': ['Fall']})

combined_df = pd.concat([spring, summer, fall], ignore_index=True)
print(combined_df)
```

```
      student     term
    0    Anna   Spring
    1     Ben   Summer
    2    Cara     Fall
```

```python
df1 = pd.DataFrame({'id': [1, 2, 3]})
df2 = pd.DataFrame({'id': [2, 3], 'value': ['X', 'Y']})

result = pd.merge(df1, df2, on='id', how='inner')
print(result)
```

```
       id value
    0   2     X
    1   3     Y
```

```python
df = pd.DataFrame({'category': ['A', 'A', 'B'], 'sales': [100, 150, 200]})
total_sales = df.groupby('category')['sales'].sum().reset_index()
print(total_sales)
```

```
      category  sales
    0        A    250
    1        B    200
```

```python
reviews = pd.DataFrame({'customer_id': [1, 1, 2], 'rating': [4, 5, 3]})
avg_ratings = reviews.groupby('customer_id')['rating'].mean().reset_index()
print(avg_ratings)
```

```
       customer_id  rating
    0            1     4.5
    1            2     3.0
```

```python
df = pd.DataFrame({'grade': ['A', 'B', 'A', 'C', 'B']})
grade_counts = df['grade'].value_counts().reset_index()
```

```
grade_counts.columns = ['grade', 'count']
print(grade_counts)
```

```
⇥▾    grade  count
     0    A      2
     1    B      2
     2    C      1
```

```
df = pd.DataFrame({'age': [5, 20, 40, 75]})
bins = [0, 18, 35, 60, 100]
labels = ['0-18', '19-35', '36-60', '61+']
df['age_group'] = pd.cut(df['age'], bins=bins, labels=labels)
print(df)
```

```
⇥▾      age age_group
     0    5      0-18
     1   20     19-35
     2   40     36-60
     3   75       61+
```

```
import pandas as pd
import numpy as np

df = pd.DataFrame({'temperature': [5, 15, 30]})

conditions = [
    df['temperature'] < 10,
    df['temperature'].between(10, 25),
    df['temperature'] > 25
]

labels = ['Cold', 'Warm', 'Hot']

# Add default value to np.select
df['temp_category'] = np.select(conditions, labels, default='Unknown')

print(df)
```

```
⇥▾      temperature temp_category
     0            5          Cold
     1           15          Warm
     2           30           Hot
```

```
df = pd.DataFrame({'Price': [100, 200, 300]})
df['discounted_price'] = df['Price'] * 0.9
print(df)
```

```
⇥▾      Price  discounted_price
     0   100              90.0
     1   200             180.0
     2   300             270.0
```
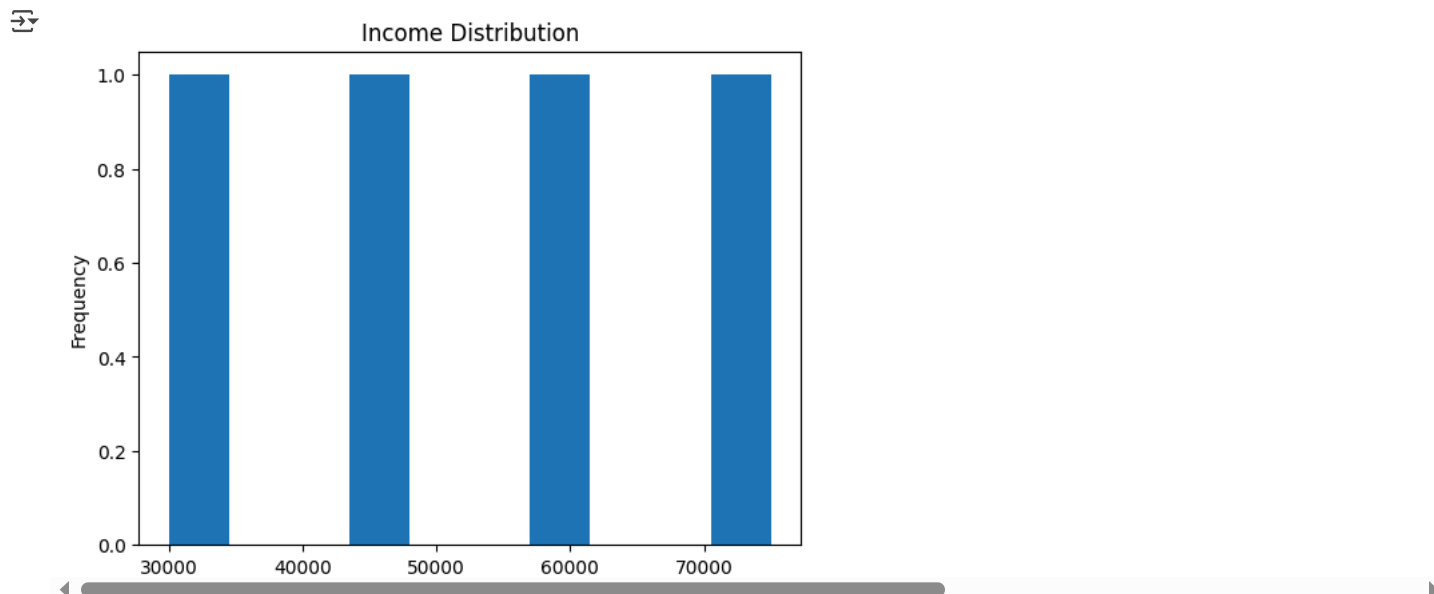
```
df = pd.DataFrame(columns=['Name', 'Age', 'Email'])
df.columns = df.columns.str.lower()
print(df.columns)
```

```
⇥▾   Index(['name', 'age', 'email'], dtype='object')
```

```
df = pd.DataFrame({'name': ['Alice'], 'age': [22]})
df.to_csv('students.csv', index=False)
print(df)
```

```
⇥▾      name  age
     0  Alice   22
```

```
df = pd.DataFrame({'Income': [30000, 45000, 60000, 75000]})
df['Income'].plot(kind='hist', bins=10, title='Income Distribution')
plt.show()
```

Income Distribution


```python
df = pd.DataFrame({
    'Month': ['Jan', 'Feb', 'Mar'],
    'ProductA_Sales': [100, 150, 200],
    'ProductB_Sales': [90, 140, 180]
})
df.plot(x='Month', y=['ProductA_Sales', 'ProductB_Sales'], kind='line')
plt.title('Monthly Sales Comparison')
plt.show()
```
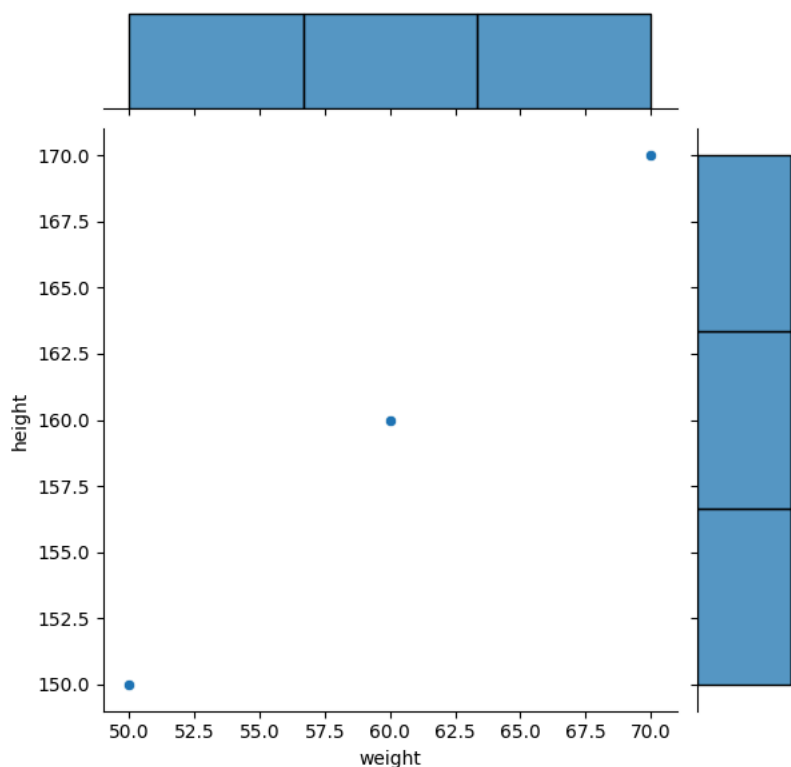
Monthly Sales Comparison
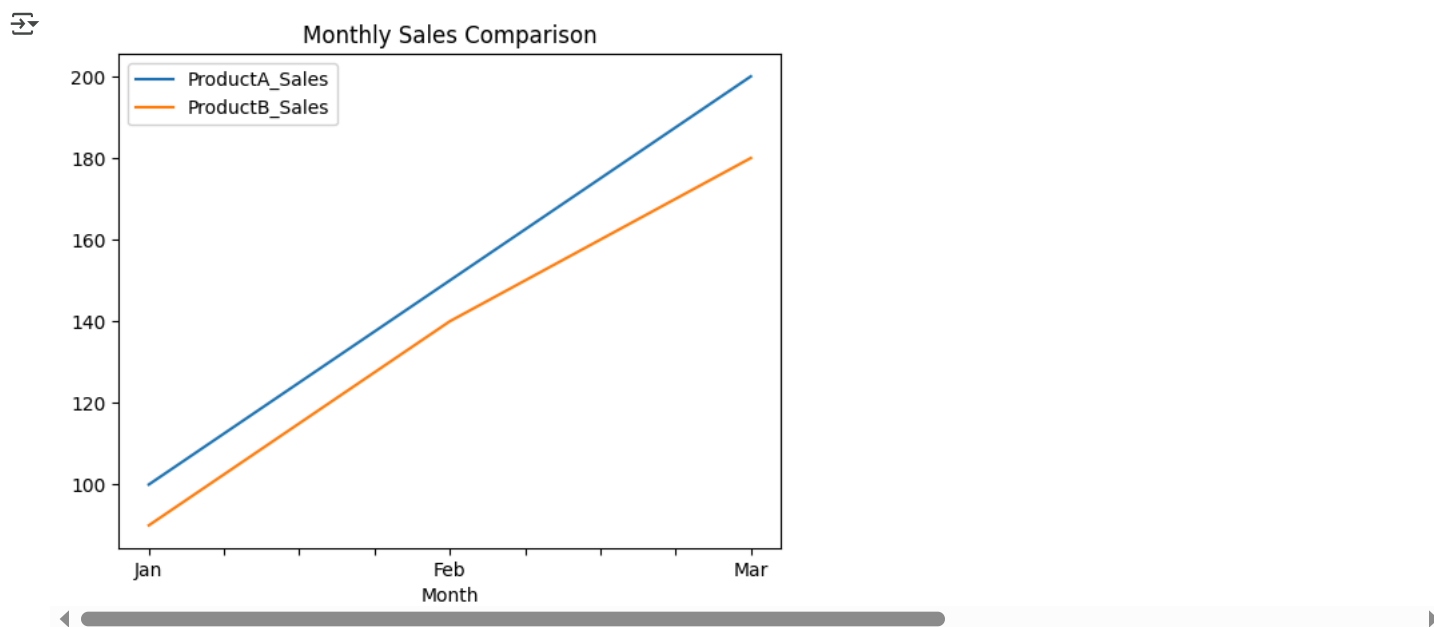

```python
df = pd.DataFrame({'Math': [80, 90, 85], 'Science': [78, 92, 88]})
df.plot.scatter(x='Math', y='Science', title='Math vs Science Scores')
plt.show()
```

Math vs Science Scores
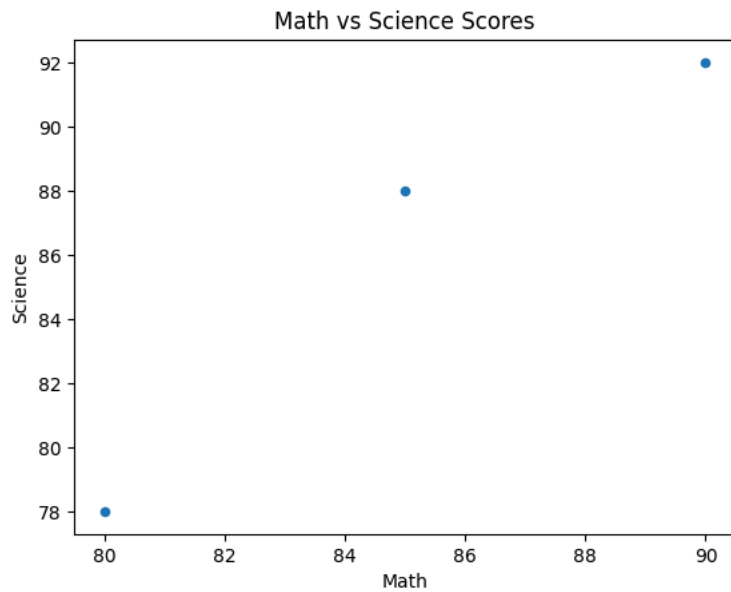

```python
df = pd.DataFrame({'age': [22, 25, 30, 45, 60, 70]})
sns.histplot(df['age'], kde=True)
plt.show()
```
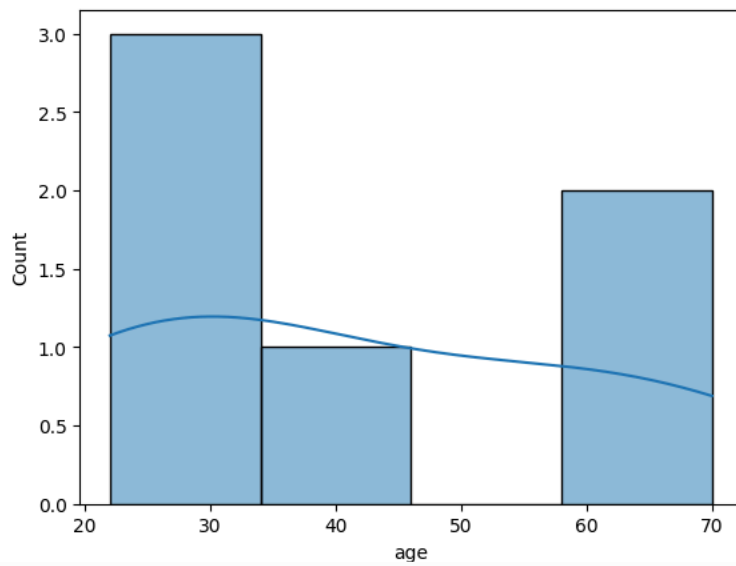


```python
df = pd.DataFrame({'weight': [50, 60, 70], 'height': [150, 160, 170]})
sns.jointplot(data=df, x='weight', y='height', kind='scatter')
plt.show()
```

```python
df = pd.DataFrame({
    'job_category': ['A', 'B', 'A', 'B', 'C'],
    'income': [30000, 40000, 35000, 45000, 50000]
})
sns.boxplot(data=df, x='job_category', y='income')
plt.title('Income by Job Category')
plt.show()
```
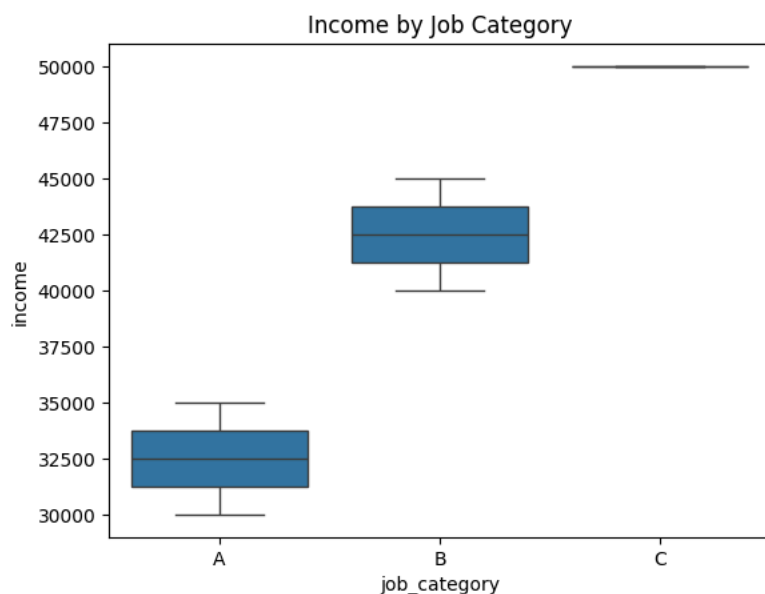


```python
survey_df = pd.DataFrame({
    'gender': ['Male', 'Female', 'Male', 'Female'],
    'product_preference': ['X', 'Y', 'Y', 'X']
})
sns.countplot(data=survey_df, x='product_preference', hue='gender')
plt.title('Product Preference by Gender')
plt.show()
```

Product Preference by Gender
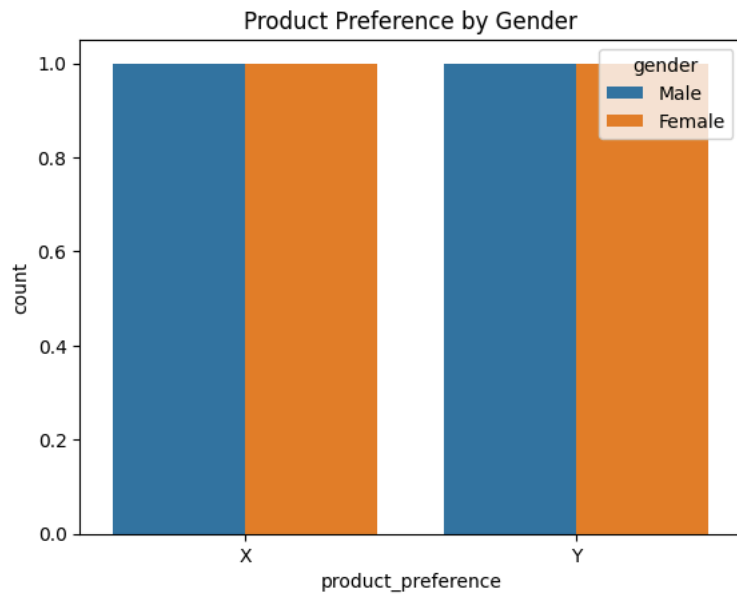

```
df = pd.DataFrame({
    'A': [1, 2, 3],
    'B': [2, 3, 4],
    'C': [5, 6, 7]
})
corr = df.corr()
sns.heatmap(corr, annot=True, cmap='coolwarm', fmt='.2f')
plt.title('Correlation Matrix')
plt.show()
```