```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
```

```
df = pd.read_csv("employee_productivity.csv")
```

```
df.head()
```

| | Employee_ID | Department | Role | Experience_Years | Working_Hours | Attendance_Rate | Tasks_Completed | Performance_Score |
|---|---|---|---|---|---|---|---|---|
| **0** | E001 | IT | Software Engineer | 2.0 | 8.0 | 95 | 120 | 8 |
| **1** | E002 | IT | Software Engineer | 5.0 | 9.0 | 92 | 140 | 9 |
| **2** | E003 | HR | HR Executive | 3.0 | 7.5 | 90 | 100 | 7 |

Next steps: Generate code with df | New interactive sheet

```
df.shape
```

```
(20, 10)
```

```
df.columns
```

```
Index(['Employee_ID', 'Department', 'Role', 'Experience_Years',
       'Working_Hours', 'Attendance_Rate', 'Tasks_Completed',
       'Performance_Score', 'Overtime_Hours', 'Salary'],
      dtype='object')
```

```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 20 entries, 0 to 19
Data columns (total 10 columns):
 #   Column             Non-Null Count  Dtype  
---  ------             --------------  -----  
 0   Employee_ID        20 non-null     object 
 1   Department         20 non-null     object 
 2   Role               20 non-null     object 
 3   Experience_Years   20 non-null     float64
 4   Working_Hours      20 non-null     float64
 5   Attendance_Rate    20 non-null     int64  
 6   Tasks_Completed    20 non-null     int64  
 7   Performance_Score  20 non-null     int64  
 8   Overtime_Hours     20 non-null     int64  
 9   Salary             20 non-null     int64  
dtypes: float64(2), int64(5), object(3)
memory usage: 1.7+ KB
```

```
df.isnull().sum()
```

| | 0 |
|---|---|
| Employee_ID | 0 |

```
df.describe()
```

| | Experience_Years | Working_Hours | Attendance_Rate | Tasks_Completed | Performance_Score | Overtime_Hours | Salary |
|---|---|---|---|---|---|---|---|
| count | 20.000000 | 20.000000 | 20.000000 | 20.000000 | 20.000000 | 20.000000 | 20.000000 |
| mean | 4.020000 | 7.800000 | 91.000000 | 120.800000 | 7.550000 | 10.650000 | 42950.000000 |
| std | 2.892568 | 0.951453 | 3.509386 | 19.033488 | 1.050063 | 6.482974 | 20085.278715 |
| min | 0.500000 | 6.000000 | 85.000000 | 90.000000 | 6.000000 | 2.000000 | 15000.000000 |
| 25% | 1.800000 | 7.375000 | 88.750000 | 103.750000 | 7.000000 | 5.750000 | 29500.000000 |
| 50% | 3.500000 | 8.000000 | 90.500000 | 122.500000 | 8.000000 | 10.000000 | 41500.000000 |
| 75% | 6.000000 | 8.500000 | 94.000000 | 132.750000 | 8.000000 | 14.250000 | 56250.000000 |
| max | 10.000000 | 9.000000 | 97.000000 | 155.000000 | 9.000000 | 25.000000 | 85000.000000 |

```
df
```

| | Employee_ID | Department | Role | Experience_Years | Working_Hours | Attendance_Rate | Tasks_Completed | Performance_Score |
|---|---|---|---|---|---|---|---|---|
| 0 | E001 | IT | Software Engineer | 2.0 | 8.0 | 95 | 120 | 8 |
| 1 | E002 | IT | Software Engineer | 5.0 | 9.0 | 92 | 140 | 9 |
| 2 | E003 | HR | HR Executive | 3.0 | 7.5 | 90 | 100 | 7 |
| 3 | E004 | HR | HR Manager | 8.0 | 8.0 | 96 | 130 | 9 |
| 4 | E005 | Sales | Sales Executive | 1.0 | 8.5 | 85 | 110 | 6 |
| 5 | E006 | Sales | Sales Manager | 6.0 | 9.0 | 88 | 150 | 8 |
| 6 | E007 | Finance | Accountant | 4.0 | 8.0 | 94 | 125 | 8 |
| 7 | E008 | Finance | Senior Accountant | 10.0 | 8.5 | 97 | 145 | 9 |
| 8 | E009 | Operations | Operations Executive | 2.0 | 7.0 | 89 | 105 | 7 |
| 9 | E010 | Operations | Operations Manager | 7.0 | 8.5 | 93 | 135 | 8 |
| 10 | E011 | IT | Data Analyst | 3.0 | 8.0 | 91 | 128 | 8 |
| 11 | E012 | IT | Team Lead | 9.0 | 9.0 | 95 | 155 | 9 |
| 12 | E013 | Sales | Sales Executive | 2.0 | 8.0 | 87 | 115 | 7 |
| 13 | E014 | HR | Recruiter | 4.0 | 7.5 | 92 | 118 | 8 |

Next steps: Generate code with df | New interactive sheet

```
df.duplicated().sum()
```

```
np.int64(0)
```

```
df['Tasks_norm'] = df['Tasks_Completed'] / df['Tasks_Completed'].max()
df['Attendance_norm'] = df['Attendance_Rate'] / 100
df['Performance_norm'] = df['Performance_Score'] / 10
```

```
df['Productivity_Score'] = (
    df['Tasks_norm'] * 0.4 +
    df['Attendance_norm'] * 0.3 +
    df['Performance_norm'] * 0.3
) * 100
```

```
df[['Employee_ID', 'Department', 'Role', 'Productivity_Score']].head()
```

| | Employee_ID | Department | Role | Productivity_Score |
|---|---|---|---|---|
| 0 | E001 | IT | Software Engineer | 83.467742 |
| 1 | E002 | IT | Software Engineer | 90.729032 |
| 2 | E003 | HR | HR Executive | 73.806452 |
| 3 | E004 | HR | HR Manager | 89.348387 |
| 4 | E005 | Sales | Sales Executive | 71.887097 |

```
def productivity_level(score):
    if score >= 75:
        return 'High'
    elif score >= 50:
        return 'Medium'
    else:
        return 'Low'

df['Productivity_Level'] = df['Productivity_Score'].apply(productivity_level)
```

```
df['Productivity_Level'].value_counts()
```

| Productivity_Level | count |
|---|---|
| High | 13 |
| Medium | 7 |

**dtype:** int64

```
df.groupby('Department')['Productivity_Score'].mean().sort_values(ascending=False)
```

| Department | Productivity_Score |
|---|---|
| Finance | 84.512097 |
| IT | 84.330968 |
| Operations | 80.597849 |
| HR | 78.799194 |
| Sales | 76.447581 |

**dtype:** float64

```
df[['Experience_Years', 'Productivity_Score']].corr()
```

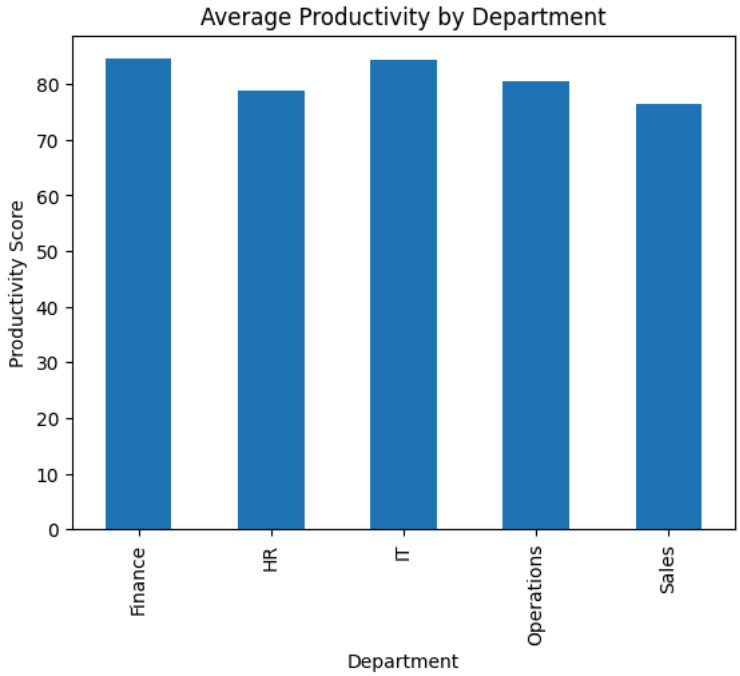
| | Experience_Years | Productivity_Score |
|---|---|---|
| Experience_Years | 1.000000 | 0.885792 |
| Productivity_Score | 0.885792 | 1.000000 |

```
df[['Working_Hours', 'Productivity_Score']].corr()
```

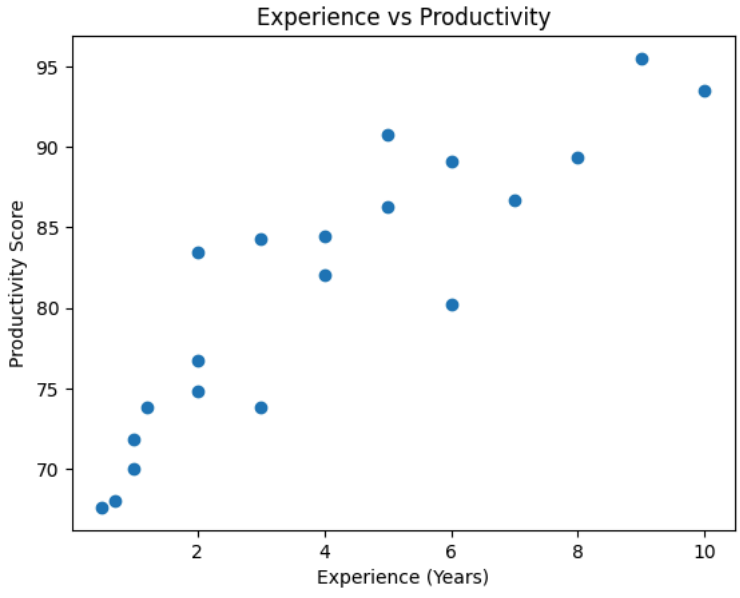
| | Working_Hours | Productivity_Score |
|---|---|---|
| **Working_Hours** | 1.000000 | 0.827179 |
| **Productivity_Score** | 0.827179 | 1.000000 |

```
import matplotlib.pyplot as plt
import seaborn as sns
```

```
df.groupby('Department')['Productivity_Score'].mean().plot(kind='bar')
plt.title('Average Productivity by Department')
plt.ylabel('Productivity Score')
plt.xlabel('Department')
plt.show()
```

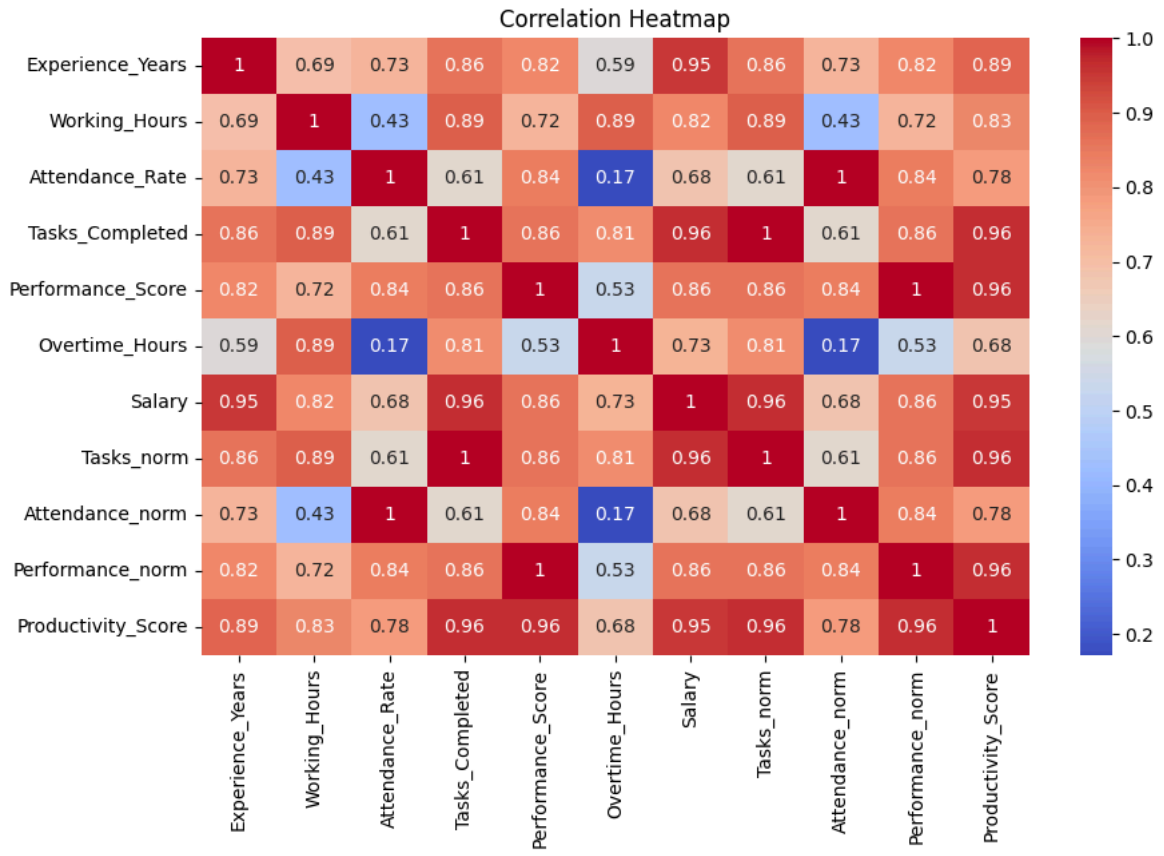



```
plt.scatter(df['Experience_Years'], df['Productivity_Score'])
plt.xlabel('Experience (Years)')
plt.ylabel('Productivity Score')
plt.title('Experience vs Productivity')
plt.show()
```




```
plt.figure(figsize=(10,6))
sns.heatmap(df.select_dtypes(include=np.number).corr(), annot=True, cmap='coolwarm')
plt.title('Correlation Heatmap')
```

```
plt.title('Correlation Heatmap')
plt.show()
```




**Insights:**

High attendance strongly improves productivity

Excess overtime negatively impacts performance

Moderate working hours give best results

Experience increases productivity up to a limit

**Recommendations:**

Encourage work-life balance

Reduce excessive overtime

Introduce performance-based incentives

Conduct department-specific training

Start coding or generate with AI.

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