Codveda — Exploratory Data Analysis (EDA)

Author: Esraa Elsayed Salama **Internship Role:** Data Analysis Intern at Codveda Technologies

Dataset: `iris_dataset.csv`

Objective: Perform EDA: summary stats, visualizations, and correlations.

In [6]:
```
import os
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns

sns.set(style="whitegrid", context="talk")
os.makedirs("../outputs/figures", exist_ok=True)
```

In [7]:
```
DATA_PATH = "../data/iris_dataset.csv"
df = pd.read_csv(DATA_PATH)

print("Shape:", df.shape)
display(df.head())
df.info()
```

```
Shape: (150, 5)
```

	sepal_length	sepal_width	petal_length	petal_width	target
0	5.1	3.5	1.4	0.2	0
1	4.9	3.0	1.4	0.2	0
2	4.7	3.2	1.3	0.2	0
3	4.6	3.1	1.5	0.2	0
4	5.0	3.6	1.4	0.2	0

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 150 entries, 0 to 149
Data columns (total 5 columns):
 #   Column        Non-Null Count  Dtype  
---  ------        --------------  -----  
 0   sepal_length  150 non-null    float64
 1   sepal_width   150 non-null    float64
 2   petal_length  150 non-null    float64
 3   petal_width   150 non-null    float64
 4   target        150 non-null    int64  
dtypes: float64(4), int64(1)
memory usage: 6.0 KB
```

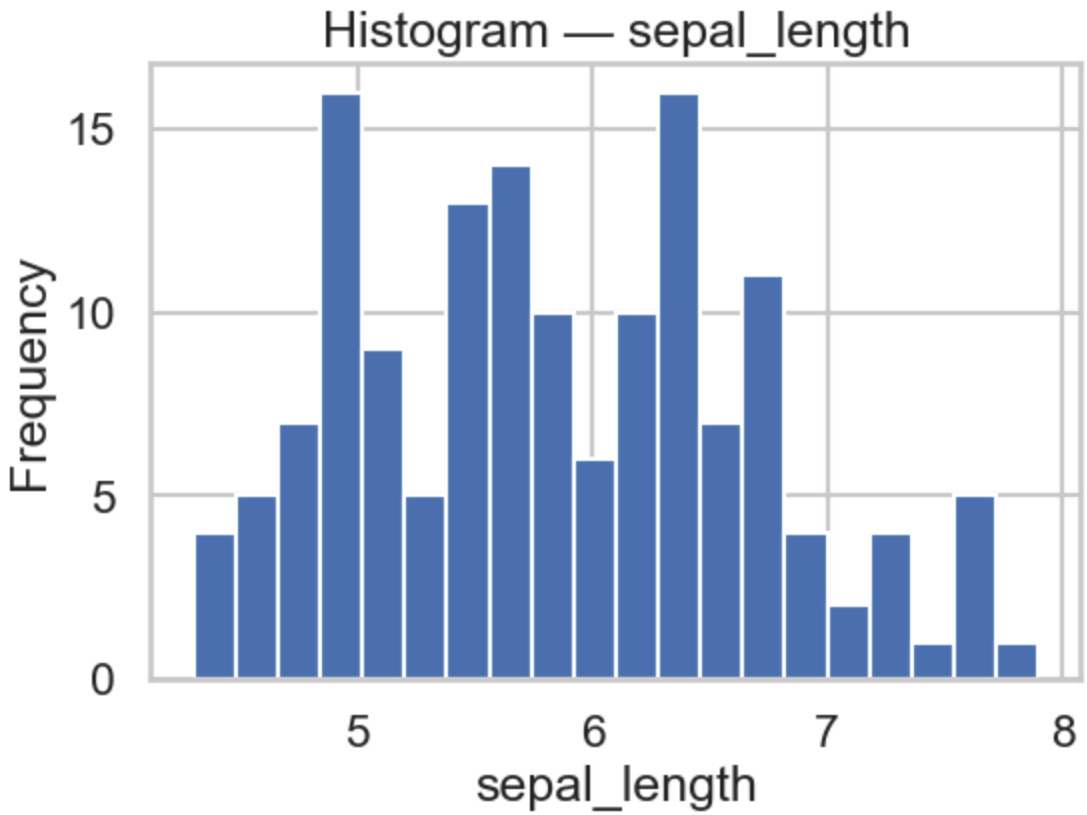
In [8]:
```
# Numeric columns
num_cols = df.select_dtypes(include=[np.number]).columns.tolist()
print("Numeric columns:", num_cols)

# Summary stats
summary = df[num_cols].describe().T
summary["mode"] = df[num_cols].mode().iloc[0]
display(summary)

summary.to_csv("../outputs/summary_stats.csv")
print("✅ Saved file: outputs/summary_stats.csv")
```

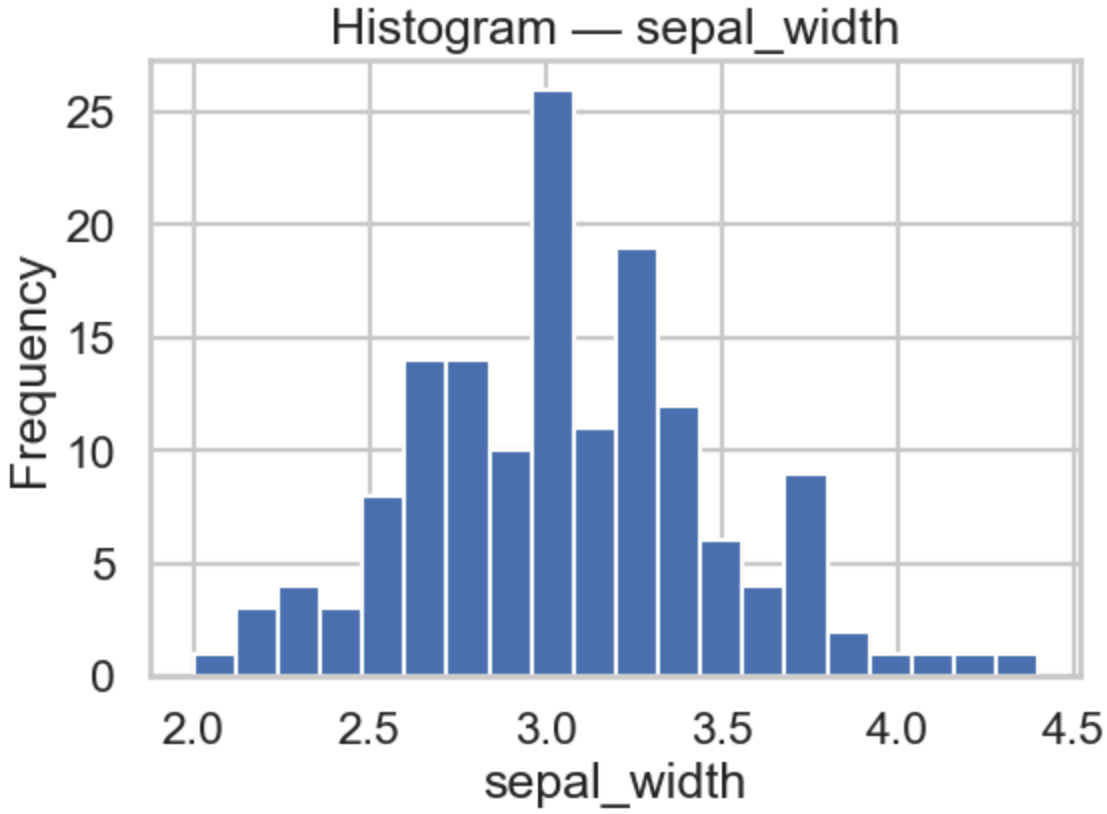
```
Numeric columns: ['sepal_length', 'sepal_width', 'petal_length', 'petal_width', 'tar
get']
```

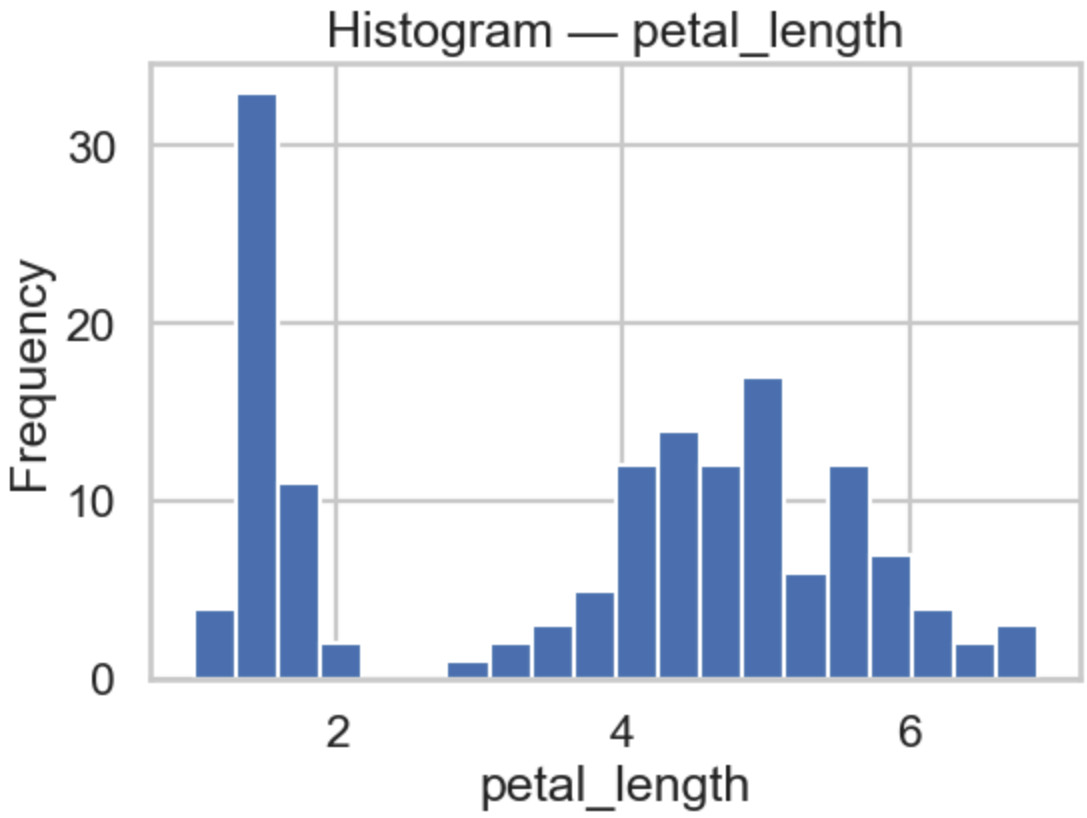
	count	mean	std	min	25%	50%	75%	max	mode
sepal_length	150.0	5.843333	0.828066	4.3	5.1	5.80	6.4	7.9	5.0
sepal_width	150.0	3.057333	0.435866	2.0	2.8	3.00	3.3	4.4	3.0
petal_length	150.0	3.758000	1.765298	1.0	1.6	4.35	5.1	6.9	1.4
petal_width	150.0	1.199333	0.762238	0.1	0.3	1.30	1.8	2.5	0.2
target	150.0	1.000000	0.819232	0.0	0.0	1.00	2.0	2.0	0.0

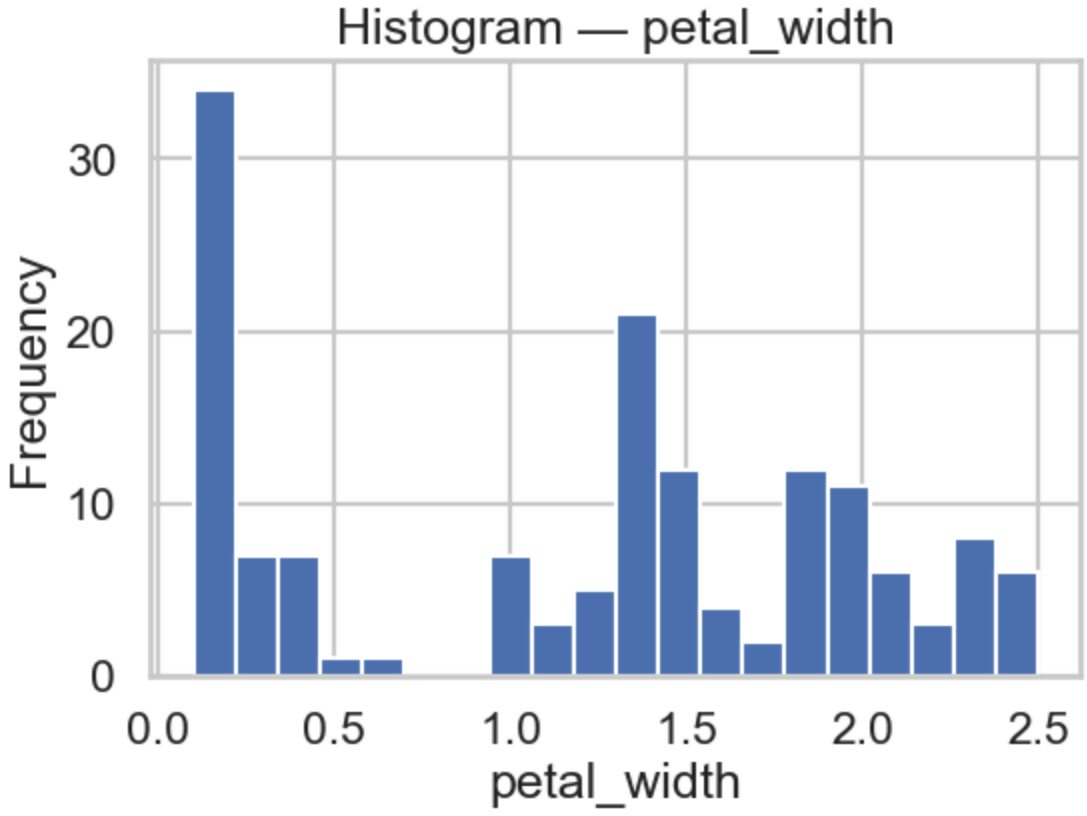
```
✅ Saved file: outputs/summary_stats.csv
```

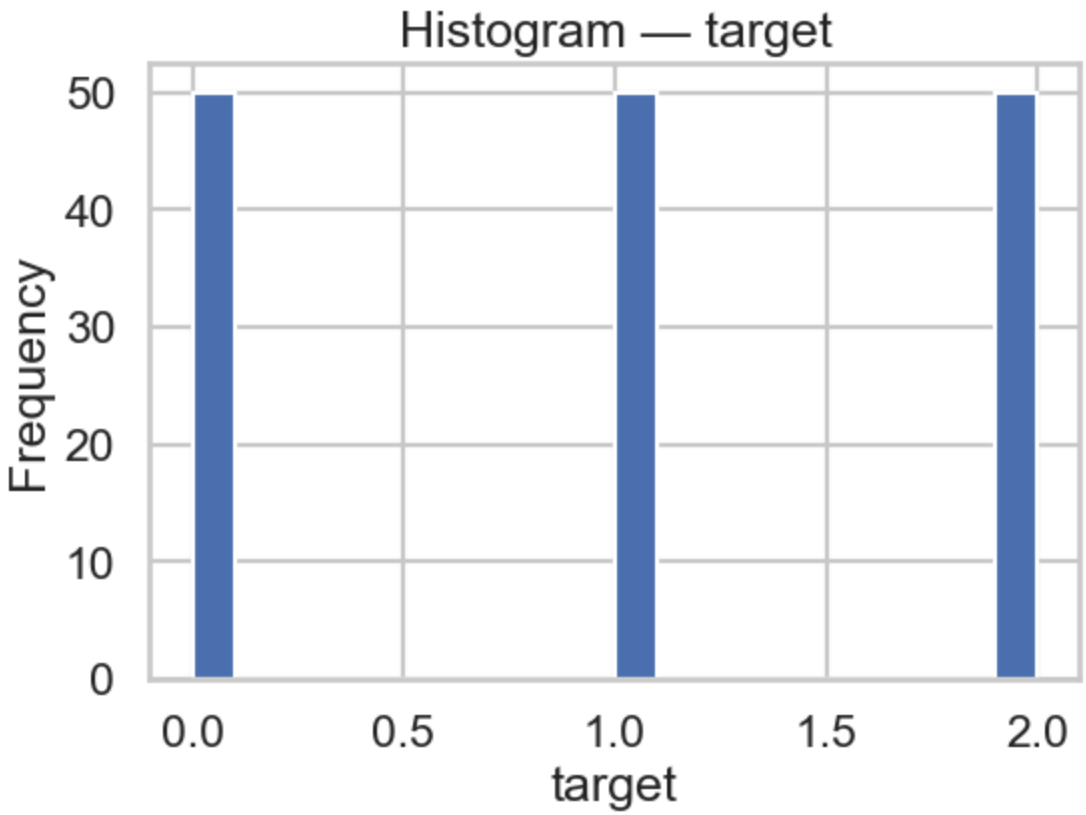
In [9]:
```
for col in num_cols:
    plt.figure(figsize=(6,4))
    df[col].hist(bins=20)
    plt.title(f"Histogram – {col}")
    plt.xlabel(col)
    plt.ylabel("Frequency")
    plt.savefig(f"../outputs/figures/hist_{col}.png", dpi=150)
    plt.show()
```


Histogram — sepal_length
Frequency
0
5
10
15
5
6
7
8
sepal_length

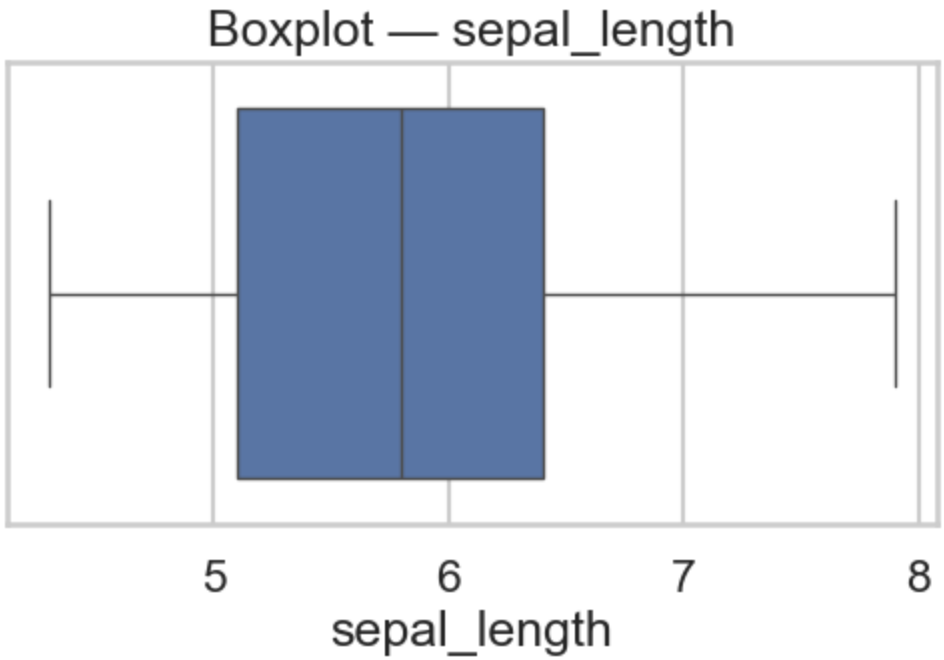

Histogram — sepal_width
Frequency
0
5
10
15
20
25
2.0
2.5
3.0
3.5
4.0
4.5
sepal_width

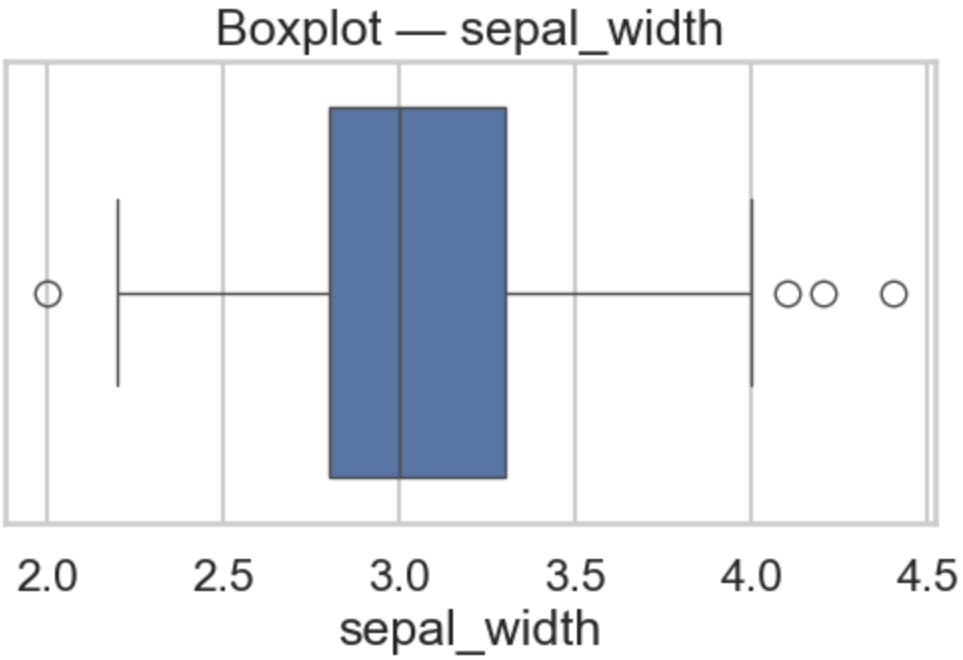

Histogram — petal_length
Frequency
0
10
20
30
2
4
6
petal_length

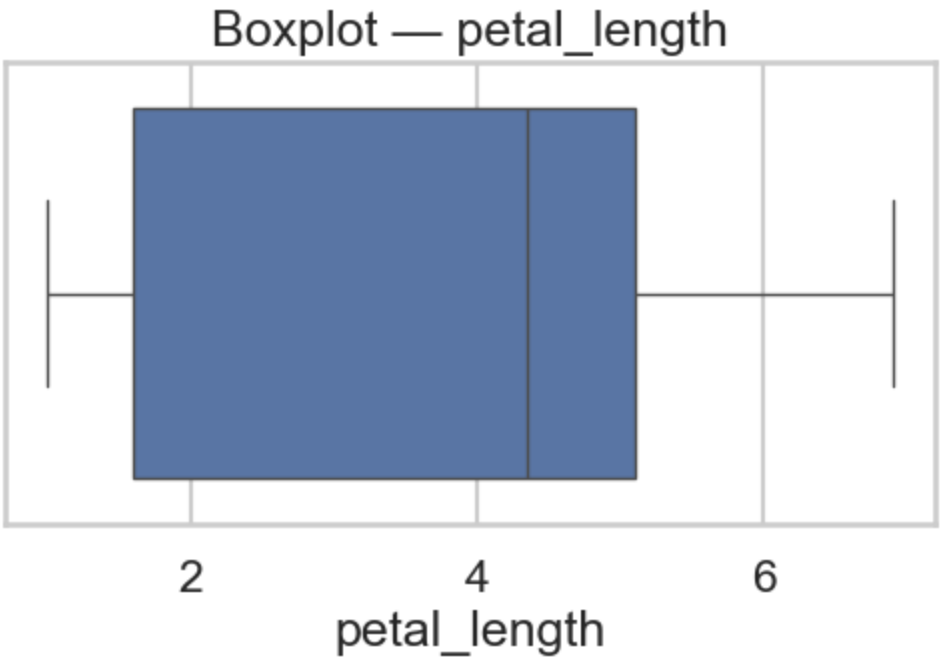

Histogram — petal_width
Frequency
0
10
20
30
0.0
0.5
1.0
1.5
2.0
2.5
petal_width

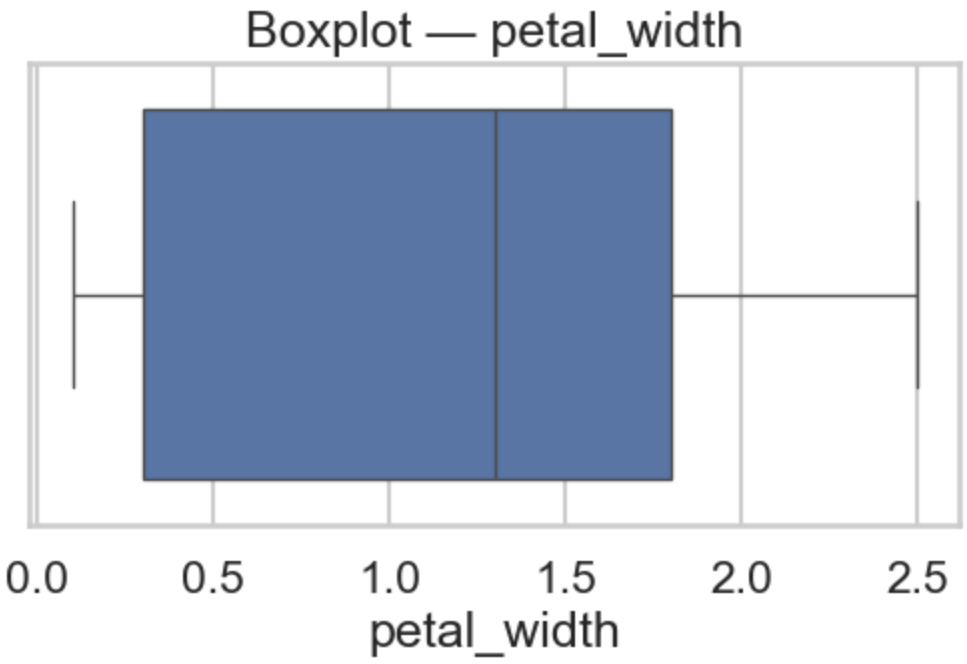


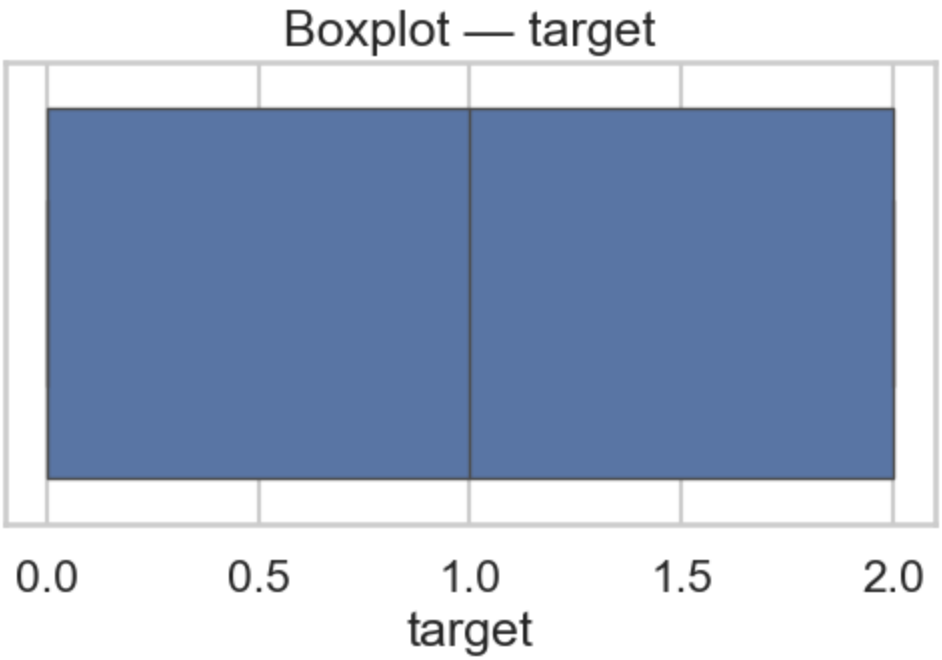
In [10]:
```
for col in num_cols:
    plt.figure(figsize=(6,3))
    sns.boxplot(x=df[col])
    plt.title(f"Boxplot — {col}")
    plt.savefig(f"../outputs/figures/box_{col}.png", dpi=150)
    plt.show()
```



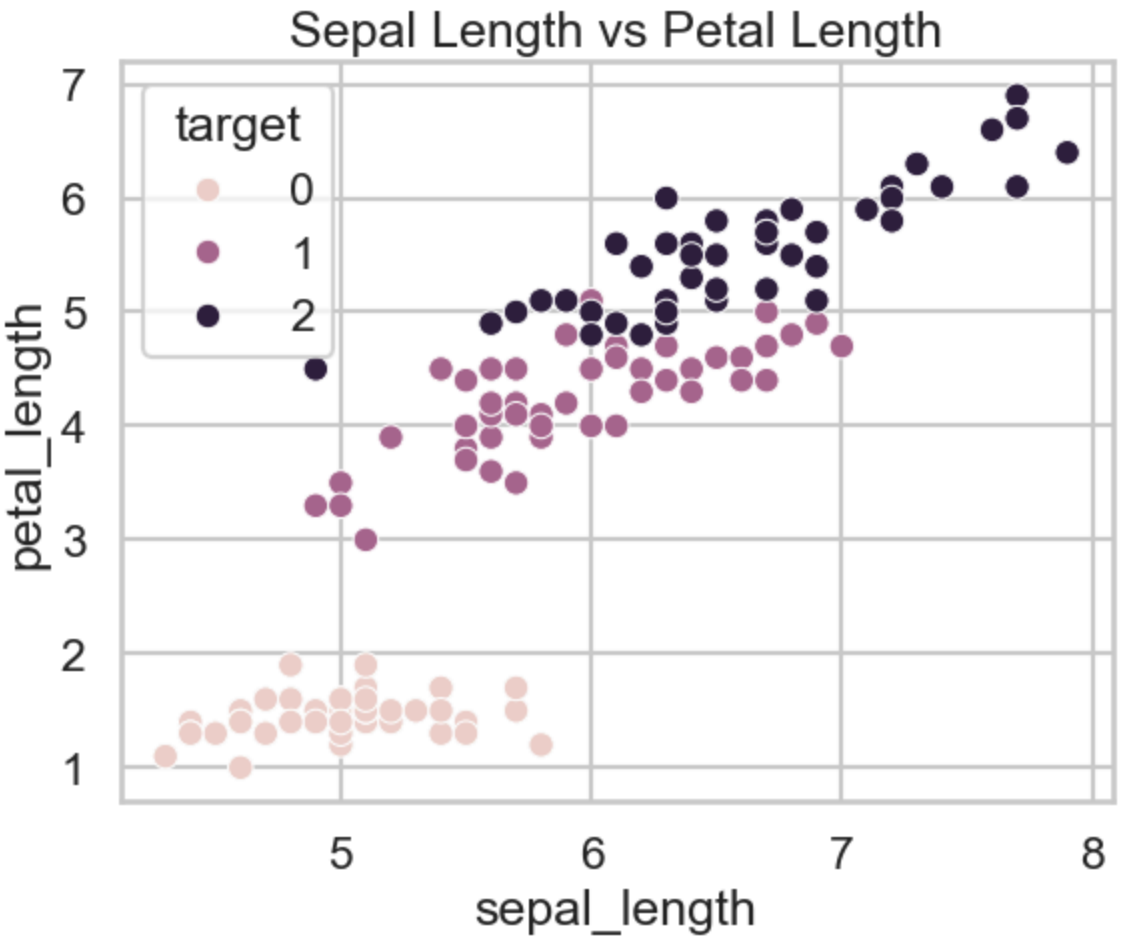

Boxplot — sepal_width
2.0
2.5
3.0
3.5
4.0
4.5
sepal_width


Boxplot — petal_length
2
4
6
petal_length

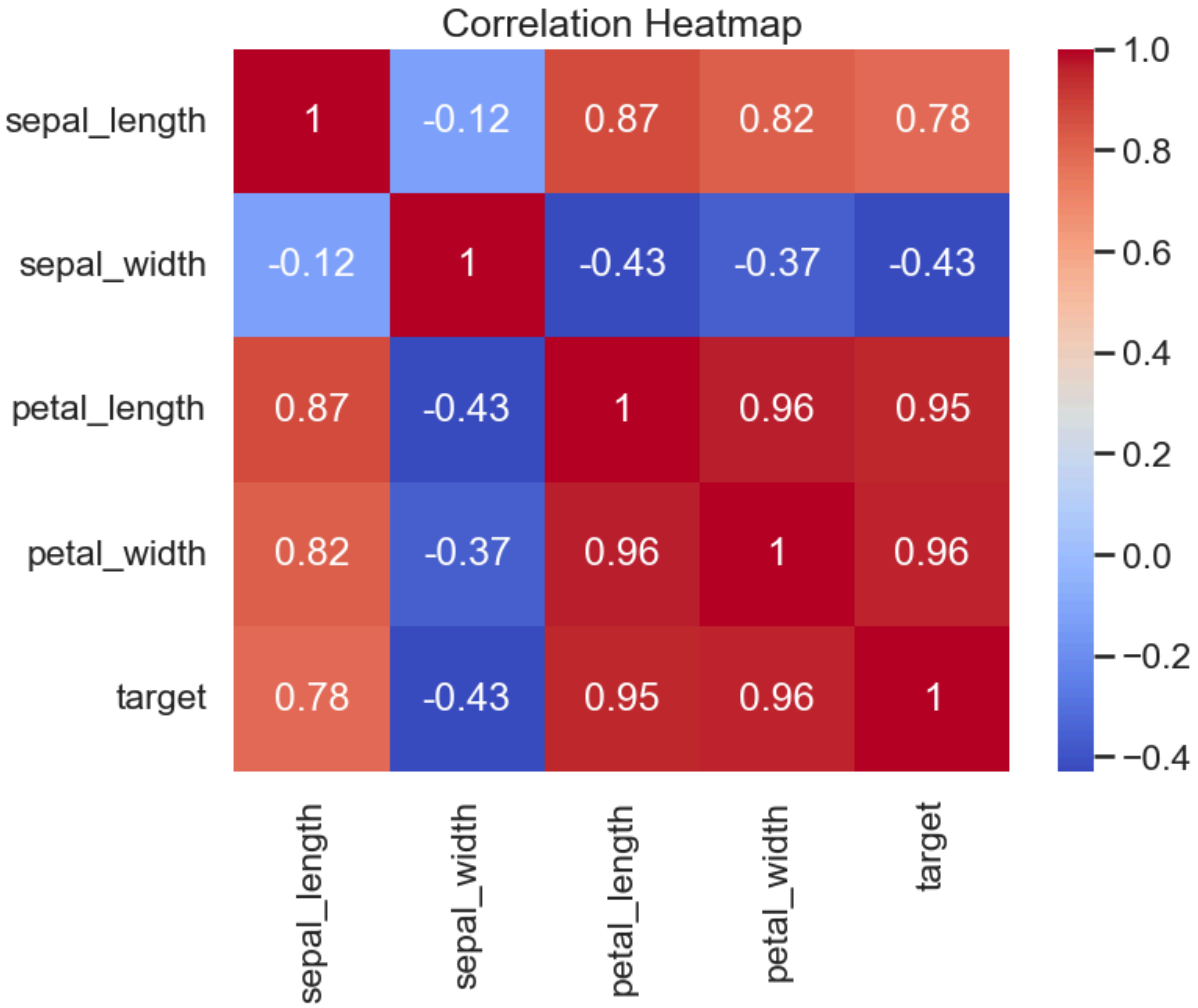




In [11]:
```
sns.scatterplot(x=df["sepal_length"], y=df["petal_length"], hue=df["target"])
plt.title("Sepal Length vs Petal Length")
plt.savefig("../outputs/figures/scatter_sepal_vs_petal.png", dpi=150)
plt.show()
```



In [12]:
```
corr = df[num_cols].corr()
plt.figure(figsize=(8,6))
sns.heatmap(corr, annot=True, cmap="coolwarm")
plt.title("Correlation Heatmap")
plt.savefig("../outputs/figures/corr_heatmap.png", dpi=150)
plt.show()
```



Findings & Conclusion

- Dataset has 150 rows × 5 columns.
- Numeric columns: sepal_length, sepal_width, petal_length, petal_width.
- Summary stats show petal_length and petal_width vary more across species.
- Histograms: sepal_length is roughly normal, petal_length shows distinct groups.
- Correlation: petal_length & petal_width strongly correlated (~0.96).
- Outliers: sepal_width has mild outliers.

Next steps:

- Use these features for predictive modelling.
- Consider reducing correlated features for models like regression.

In [ ]: