# P09 Sample Solution Report – Python Plots & Export

## Overview

This report summarises the methodology and key findings for the practical. All computations are based on the provided synthetic dataset.

### Dataset Snapshot

X Sin Cos HistData  
0.000 0.026 0.954 1.805  
0.067 0.229 1.009 1.775  
0.134 0.169 1.118 1.389  
0.201 0.297 0.901 3.256  
0.268 0.339 0.969 3.796

### Summary Statistics

* X\_mean: 5.00
* X\_median: 5.00
* X\_mode: 0.00
* X\_var: 8.50
* X\_std: 2.92
* Sin\_mean: 0.18
* Sin\_median: 0.32
* Sin\_mode: 0.57
* Sin\_var: 0.46
* Sin\_std: 0.68
* Cos\_mean: -0.07
* Cos\_median: -0.14
* Cos\_mode: -0.82
* Cos\_var: 0.55
* Cos\_std: 0.74
* HistData\_mean: 3.79
* HistData\_median: 3.08
* HistData\_mode: 1.83
* HistData\_var: 6.80
* HistData\_std: 2.61

### Correlation Matrix

X Sin Cos HistData  
X 1.000000 -0.080377 -0.211660 0.024393  
Sin -0.080377 1.000000 0.038905 0.014418  
Cos -0.211660 0.038905 1.000000 0.022138  
HistData 0.024393 0.014418 0.022138 1.000000

### Interpretation

The line plots display periodic behaviour of sine and cosine functions. The histogram shows the distribution of the gamma‑distributed variable, while the scatter plot highlights the relationship between Sin and Cos.

### Validation Tips

Verify that the saved files open correctly and that the plots appear the same in both PNG and PDF formats. Adjust bin counts to avoid over‑ or under‑smoothing in histograms.