# P09 Instructor & Reference Guide – Python Plots & Export

## Theory Brief

Matplotlib is a versatile Python library for data visualisation. It allows creation of different chart types and customisation of nearly every element.

## Worked Example

Below is a snapshot of the first few rows of the synthetic dataset and summary statistics:

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

### Basic 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

### Visualisations

An example plot is saved in the results folder as P09\_plot1.png.

## Evaluation Rubric

* Correct generation of plots (50%)- Proper customisation and labelling (30%)- Successful export of multiple formats (10%)- Insightful commentary (10%)

## Common Pitfalls

Forgetting to label axes, not setting figure sizes appropriately, or failing to close figures before saving new ones.