# P02 Sample Solution Report – Box Plot, Regression, T‑Test & Chi‑Square

## Overview

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

### Dataset Snapshot

X Y Group Response Category  
4.697 10.761 B 54.52 Red  
4.477 14.534 A 49.18 Red  
1.241 1.053 A 34.95 Blue  
7.548 21.347 A 40.24 Yellow  
9.730 30.398 A 58.08 Green

### Summary Statistics

* X\_mean: 4.74
* X\_median: 4.46
* X\_mode: 0.09
* X\_var: 7.83
* X\_std: 2.80
* Y\_mean: 14.29
* Y\_median: 13.67
* Y\_mode: -0.82
* Y\_var: 74.28
* Y\_std: 8.62
* Response\_mean: 53.56
* Response\_median: 53.53
* Response\_mode: 45.53
* Response\_var: 73.66
* Response\_std: 8.58

### Correlation Matrix

X Y Response  
X 1.000000 0.973354 -0.063655  
Y 0.973354 1.000000 -0.071508  
Response -0.063655 -0.071508 1.000000

### Interpretation

The box plot reveals the spread and outliers of the Response variable. Regression analysis indicates the nature of the relationship between X and Y. The t‑test result suggests whether Group A and Group B differ significantly. The chi‑square statistic informs us whether category distribution deviates from uniformity.

### Validation Tips

Use built‑in statistics tools to confirm regression and t‑test results. When performing chi‑square, ensure that expected frequencies are calculated correctly and that categories are mutually exclusive.