



Investigation 4. Time Series in Action

You are going to complete your own time series investigation and submit a word document (or PDF) summarizing your findings. You may either:

- **Survey your peers** (e.g., ask them about their daily/weekly behaviour), or
- **Research data online** (e.g., from ABS, Bureau of Meteorology, sports statistics, Google Trends, etc.).

Step 1 – Choose your question. Pick something that changes over time, and preferably something that interests you. Examples:

- *Average hours of sleep each night over 2 weeks*
- *Weekly hours spent on social media*
- *Weekly sales data for a product (from ABS or other source)*

Clearly define your investigation question: *****“How does ____ change over ____?”****

Step 2 – Collect raw data.

- Record at least 10–20 time periods (days, weeks, etc) over multiple cycles.
- Present your data in a table using Excel.

Step 3 – Use Excel to plot a time series graph (using raw data)

Step 4 – Smooth the data

- Apply a moving average (3-point, 5-point, or 7-point depending on your data).
- Plot the smoothed series on the same graph as the raw data from step 3.

Step 5 – Deseasonalise the data

- Calculate the seasonal indices for your data
- Use your seasonal indices to deseasonalise the data.
- Plot both the raw and deseasonalised series on a new graph using Excel.

Step 6 – Fit a model

- Use your CAS calculator to fit a least-squares regression line to the deseasonalised data. Write down the equation, gradient, intercept, r , and r^2 .

Step 7 – Communicate your findings

Use the template on the next page to prepare a report for your investigation.



SUGGESTED ORDER FOR INVESTIGATION REPORT.

1. Cover Page

2. Table of Contents

3. Introduction

- State the question clearly (e.g., “How do daily steps vary across 14 days?”).
- Explain why it is relevant/interesting.

4. Methodology

- How data was collected (survey, ABS, Google, etc.).
- Any assumptions made (sample size, time frame, limitations).
- Tools used (Excel, CAS calculator).

5. Results

- Present the raw data in a neat table.
- Graphs: raw time series, smoothed data, deseasonalised data, regression line (copied from Excel)
- Calculations: seasonal indices, deseasonalised values, regression equation, r , r^2
- Clear headings and figure numbers for every graph/table.

6. Discussion / Interpretation

- What the results show in context (trend, seasonality, patterns).
- What the gradient and intercept mean.
- Meaning of r and r^2 .
- Limitations (sample size, randomness, accuracy).

7. Conclusion

- Restate the question.
- Provide a concise answer backed up by evidence.
- Suggest how the findings could be useful

8. References *(if external data is used)*

- ABS, BOM, Google Trends, etc.

9. Appendices

- All Excel data / graphs / tables
- CAS calculator screenshots (if possible).
- Any working that didn't fit neatly in the main body.