Honours Multivariate Analysis
Continuous Assessment 4

Instructions:

- You will be divided into groups for this assessment. Only 1 submission per group is required.

- Your **.pdf** report may be compiled using any software you like (Rmarkdown, LaTeX, MSWord, etc.), as long as the presentation is neat.

- Do NOT paste R output verbatim, this will be penalised. If you want to include R output, typeset it properly or present it in a table.

- To help the reader easily assimilate the information, round values to a small number of decimal places (unless there is a reason for expressing a more exact value).

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1. Suppose $\boldsymbol{X} \sim N_p(\boldsymbol{\mu}, \boldsymbol{\Sigma})$. Show that the maximum likelihood estimator of $\boldsymbol{\Sigma}$ is biased, and give the bias.

2. Consider again the Egyptian skull data from CA1, given in `CA1.csv`. Examine the variables in period 2 for marginal and multivariate normality by creating the necessary QQ-plot(s) and chi-square plot(s). Apply any statistical test to the univariate hypotheses and report a measure of the p-value. For the multivariate test, interpret the observed squared generalised distances.