

Assignment for 2005 Bergen course in *Data analysis for weather and climate research*

The assignment is to perform a statistical analysis of Bergen precipitation observations and to summarise your analysis in a written report. The assignment will be assessed based on your report, which should address in separate sections each of the five points listed below, and should not exceed 10 pages (including figures).

Q1. Summarise the main features of the data and compare the rainfall in the four seasons.

Q2. The England and Wales Precipitation (EWP) dataset is a single time series of rainfall amounts constructed from about 60 rain gauges. Compare the Bergen dataset with the EWP dataset using statistical methods. Find the seasons where we have the largest and smallest correlation between the two rainfall datasets.

Q3. A colleague used a Normal distribution as a probability model for total winter rainfall and used the model to estimate the probability of exceeding the amount recorded from December 2003 to February 2004. Fit this model and estimate the probability. Now estimate the probability using a Gamma distribution. Comment on the reliability of these two probability estimates, and give a conclusion of which distribution you prefer.

Q4. Assess the evidence for the hypothesis that winter and summer rainfall in Bergen in total have equal population means. Provide point and interval estimates for the difference in means.

Q5. Describe and assess the strength of evidence for time trends in Bergen rainfall in each of the four seasons.

Data sets (available from www.met.rdg.ac.uk/cag/courses/bergen2005):

- **bergen.txt** contains the seasonal and annual rainfall totals (in millimetres) for the years 1890 to 2004. The Bergen precipitation rainfall amounts are constructed from two rain gauges: Florida and one at Fredriksberg (earliest years only). The four seasons are winter (December, January, February), spring (March, April, May), summer (June, July, August) and autumn (September, October, November).
- **ewp.txt** contains the seasonal and annual rainfall totals (in millimetres) for the years 1767 to 2001. The four seasons are winter (December, January, February), spring (March, April, May), summer (June, July, August) and autumn (September, October, November).

The report must be submitted to Anne-Lin Brobakke at GFI before **Friday 28 October 2005**.

Nils Gunnar Kvamstø, August 2005, Bergen.

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