# TMA4275 LIFETIME ANALYSIS

## Algorithm for TTT-plot and Barlow-Proschan's test.

1. Order all the observed times, both observed failure times and observed censoring times.
2. Calculate the Total Time on Test (TTT) at *each* of these times.
3. Let $Y_1, Y_2, \ldots, Y_k$ be the computed TTT at the *failure* times only.
4. Draw TTT-plot, i.e., *plot the points*

$$\left(\frac{i}{k}, \frac{Y_i}{Y_k}\right) \text{ for } i = 1, 2, \ldots, k,$$

5. Calculate the Barlow-Proschan statistic

$$W = \frac{Y_1}{Y_n} + \frac{Y_2}{Y_k} + \cdot + \frac{Y_{k-1}}{Y_k}$$

and then

$$Z = \frac{W - \frac{k-1}{2}}{\sqrt{\frac{k-1}{12}}}$$

6. To test with level $\alpha$ the hypotheses

$$H_0 : T \sim expon(\lambda) \text{ for some } \lambda$$

$$\textit{versus } H_1 : \begin{cases} T \text{ is IFR : Reject if } Z \geq z_\alpha \\ T \text{ is DFR: Reject if } Z \leq -z_\alpha \\ T \text{ has monotone hazard: Reject if } Z \leq -z_{\alpha/2} \text{ or } Z \geq z_{\alpha/2} \end{cases}$$