Handout 20: Order Statistics

Let $X_1, \ldots, X_n$ be a sequence of n random variables. We can define the **k-th order statistic** Y_k to be the value of the k-th largest random variable X_j. Note that: the first order statistic is the smallest value; for odd n the $(n+1)/2$-th order statistic is the median; the n-th order statistic is the maximum value. We will see several properties of order statistics on today's worksheet.

Order statistics have a number of applications. For example, we can use the median as a robust measurement of centrality. Or, the difference between different order statistics as a robust measurement of the central tendency. We can also use order statistics to check whether a set of data comes from a given distribution. Or, apply them to the very important study of extremal events (such as extreme floods or catastrophic financial events).