ORDER STATISTICS

Let $X_1, X_2, ..., X_n$ be iid continuous rvs with pdf $f(x)$ and cdf $F(x)$. The **order statistics** of this random sample are $Y_1, Y_2, ..., Y_n$, where

$$Y_i = \text{the } i^{th} \text{ smallest value among } X_1, X_2, ..., X_n.$$

MIN: $Y_1 = \min(X_1, ..., X_n)$ has pdf $g_1(y) = n[1 - F(y)]^{n-1} \cdot f(y)$

MAX: $Y_n = \max(X_1, ..., X_n)$ has pdf $g_n(y) = n[F(y)]^{n-1} \cdot f(y)$

i^{th} Smallest: Y_i has pdf $g_i(y) = \dfrac{n!}{(i-1)!\,(n-i)!}[F(y)]^{i-1}[1-F(y)]^{n-i} \cdot f(y)$