

# Re: Probability of rth order statistic

---

*Source:* <http://sci.tech-archive.net/Archive/sci.stat.math/2005-12/msg00048.html>

---

- *From:* "Luis A. Afonso" <[licas@xxxxxxxxxxxx](mailto:licas@xxxxxxxxxxxx)>
  - *Date:* Sun, 04 Dec 2005 12:14:06 EST
- 

The unmistakable impression that I draw from the Richard Ulrich's feedback (as questions) to the problem posted by *\*Patrik\** is that he is *\*virgin\** about the classic *\*Statistics of Extremes\**. The worse of all of this is that he could simply *\*think\** in order that to avoid the *\*dunk\** he posted (Isn't it simply  $1/N$ ?). Because I am a nice guy I will teach him (the following is a translation from a *\*elementary\** Portuguese textbook on Statistics\*).

*\*\*\**Let be a set of  $n$  random continuous variables (r.v.) i.i.d. (identically independently distributed)  $X_1, X_2, \dots, X_n$  with density  $f(x)$ ; therefore the Distribution Function is

$$F(x) = \int_{-\infty}^x f(t) dt$$

We will note  $X^{(k)}$  the  $k$ th r.v. – ( $k$ th ordinal statistics)– the value that one have  $k-1$  values that are lesser than it. That is:

$$X^{(1)} \leq X^{(2)} \leq \dots \leq X^{(n)}$$

$X^{(1)}$  is the (first) minimum,  $X^{(2)}$  the second, ...,  $X^{(n)}$  the  $n$ th minimum or maximum.

Because we put

$$F_k(x) = \text{prob.}(X^{(k)} \leq x) \text{ we have (Bernouilli Distribution):}$$

$H$  is the probability that the number of values lesser or equal to  $x$  be greater or equal to  $k$ .

$$H = \sum_{j=k}^n \binom{n}{j} [F(x)]^j [1-F(x)]^{n-j}$$

Therefore

$$F_k(x) = \frac{n!}{(k-1)! (n-k)!} F^{k-1} (1-F)^{n-k} f(x)$$

(for  $n$  sufficiently large a normal approach is possible).

That's all (*\*folks\**)

licas (Luís A. Afonso)

---

- *Follow-Ups:*
  - ◆ *Re: Probability of rth order statistic*
  - ◇ *From:* Patrik

- *References:*
  - ◆ *Probability of rth order statistic*
  - ◇ *From:* Patrik

- Prev by Date: *Need Immediate help!*
- Next by Date: *Re: Need funny statistical t-shirt idea*
- Previous by thread: *Re: Probability of rth order statistic*
- Next by thread: *Re: Probability of rth order statistic*

Re: Probability of rth order statistic

- Index(es):
  - ◆ *Date*
  - ◆ *Thread*