Hypergeometric Probability

Example: In a box containing 10 products, 3 of them are defective and 7 are good. If 4 are selected at random from these 10 products without replacement what is the probability that 2 of them will be defective products?

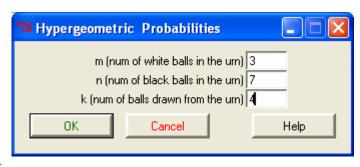
Step 1: Click through the following menu selections:

IPSUR-Probability

Discrete distributions

Hypergeometric probabilities... 7≰ R Commander File Edit Data Statistics Graphs Models IPSUR-Probability Tools Help Birthday Problem... Edit dat <No active dataset> No active model> Continuous Distributions > **Output Window** Discrete Distributions Binomial distribution Sampling Distributions Discrete Uniform distribution Geometric distribution Hypergeometric distribution Hypergeometric quantiles... Negative binomial distribution 🕨 Hypergeometric tail probabilities... Hypergeometric probabilities... Poisson distribution Messages Plot hypergeometric distribution... Simulate hypergeometric variates... NOTE: R Commander Version 1.2-1: Wed Dec 12 09:38:12 2007

Step 2: The **m** in the dialog should be 3 and **n** should be 7, and the number of products selected in the random sample **k** would be 4. Enter these values into the dialog box as shown below and click OK. The probability distribution for this sampling will be displayed in the R Commander window.



R Output

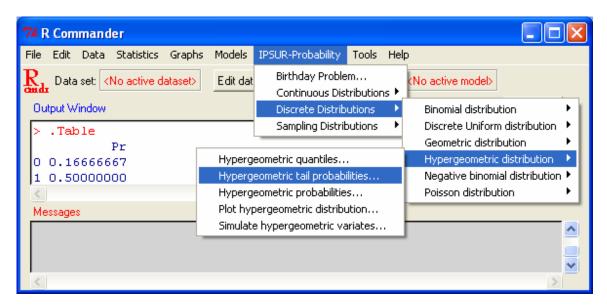
0 0.16666667 1 0.50000000 2 0.30000000

3 0.03333333

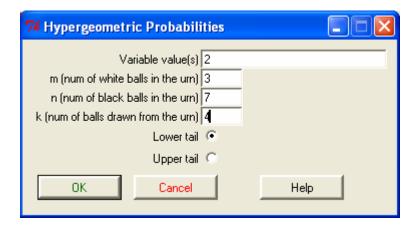
The answer to this problem is P(X = 2) = 0.3.

Tail Probability (Cumulative Probability)

If one wishes to find the cumulative probability such as the probability of having 2 or less defective products, then one should choose the tail probability option.



And, in the dialog box enter value 2 in the variable value(s) box to specify the event and check Lower tail bullet since the probability $P(X \le 2)$ is to be calculated. The rest of boxes would be the same as first example. And, click OK.



R Output

```
> phyper(c(2), m=3, n=7, k=4, lower.tail=TRUE)
[1] 0.9666667
```

So, the answer would be 0.9666667.