## 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?

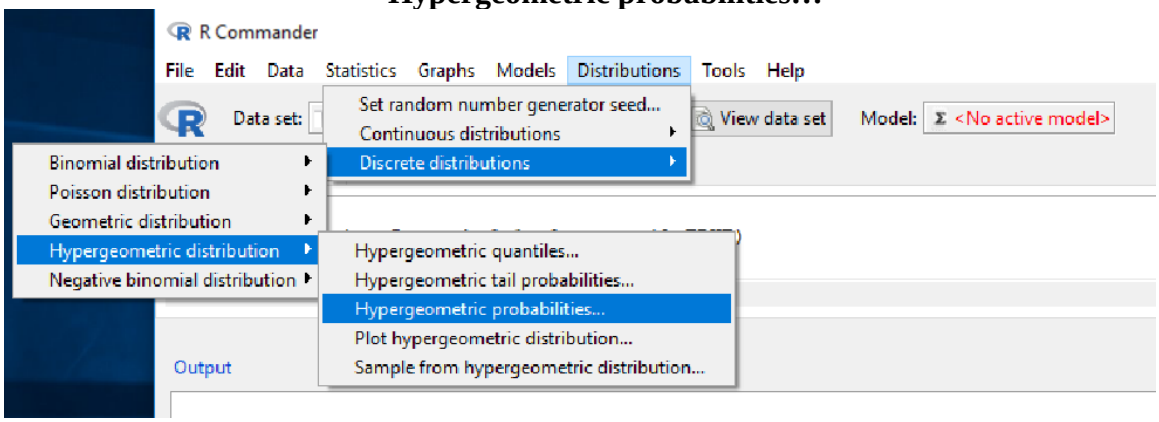
Step 1: Click through the following menu selections:

**Distributions**

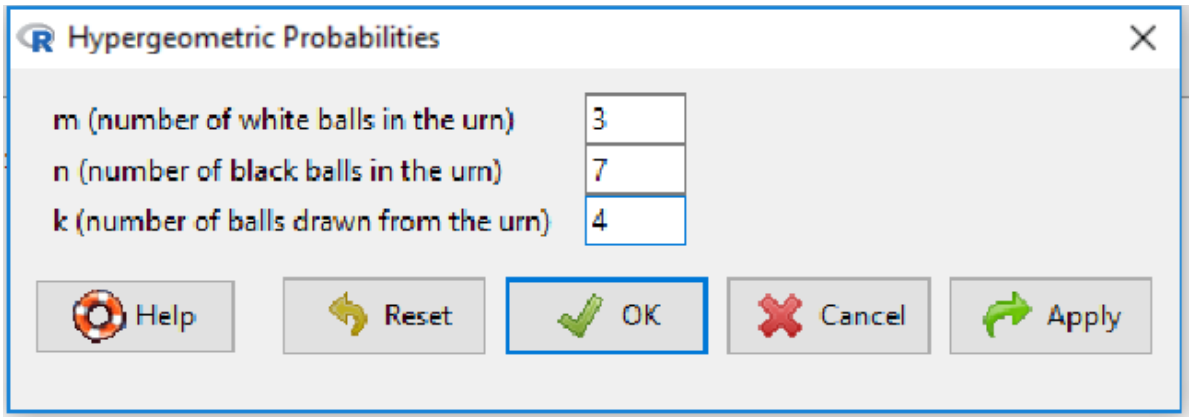
**Discrete distributions**

**Hypergeometric distribution**

**Hypergeometric probabilities…**




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.



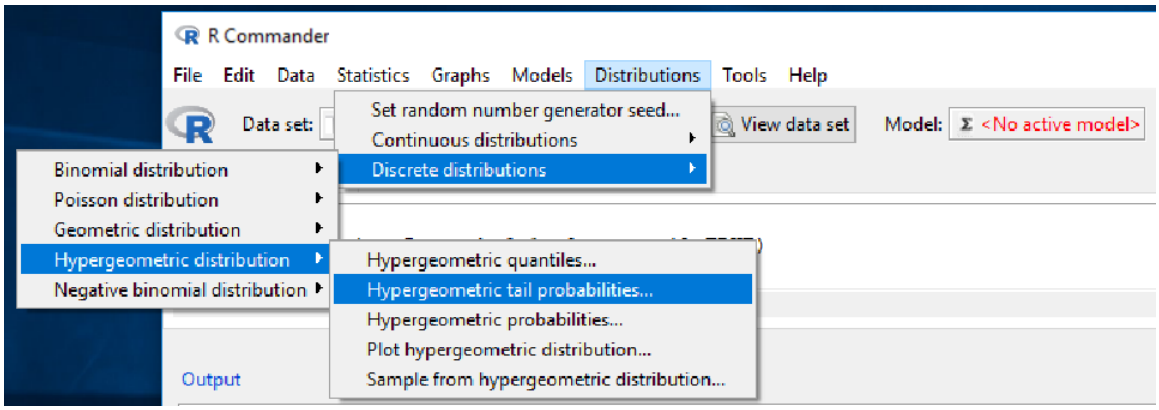

R Output

```
  Pr
0 0.16666667
1 0.50000000
2 0.30000000
3 0.03333333
```

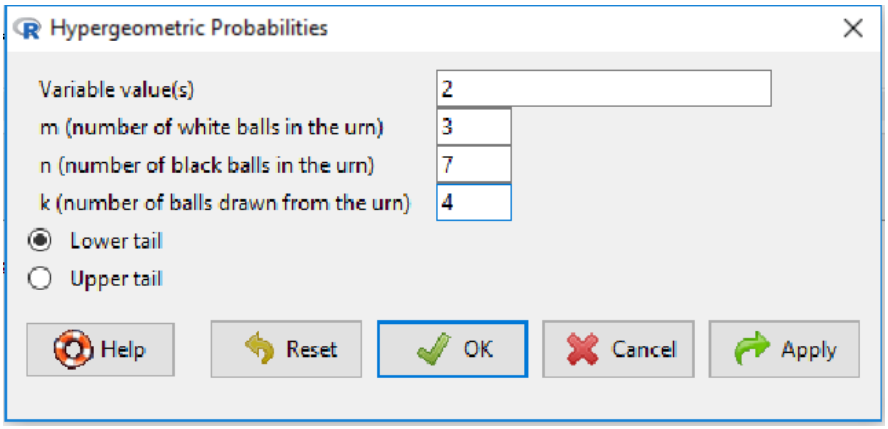
The answer to this problem is $P(X = 2) = 0.3$.

**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 $P(X \leq 2)$ 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.