

Binomial Probabilities

Example Problem: If 10% of the population in a community have a certain disease, what is the probability that 4 people in a random sample of 5 people from this community has the disease?

Identify $n = 5$, $p = .10$, $x = 4$

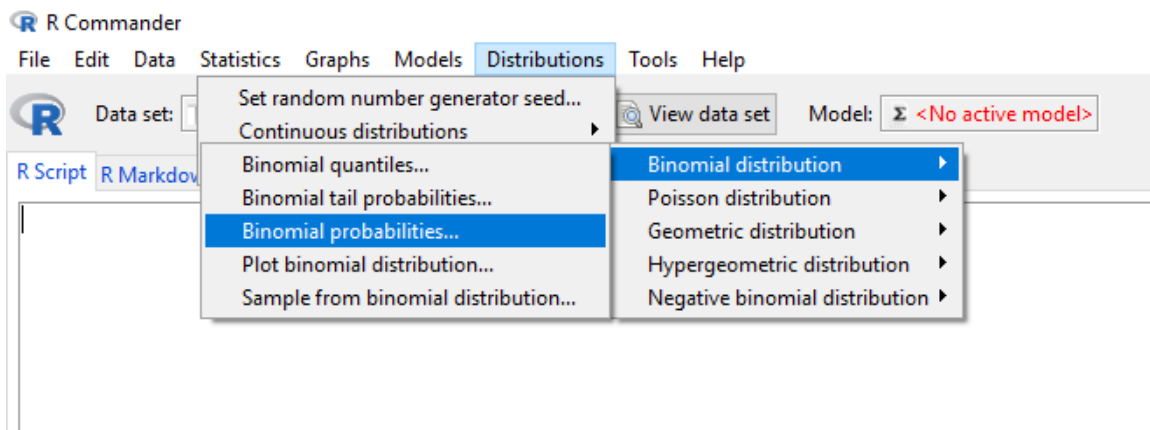
1) To solve this problem perform the following menu selections:

Distributions

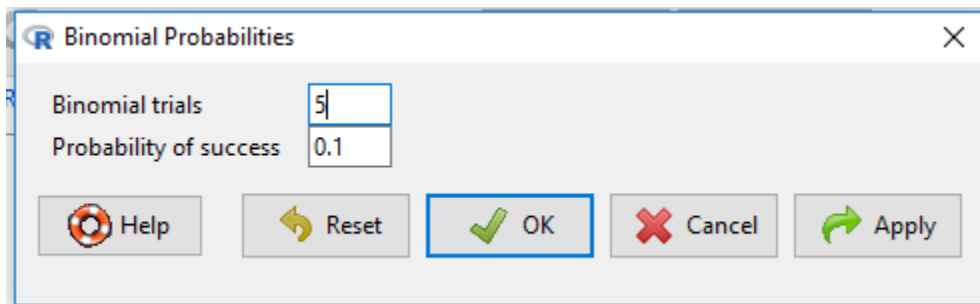
Discrete Distributions

Binomial distribution

Binomial probabilities ...



2) Then enter your data. And click OK.



Output from R Commander gives the probability distribution (p.m.f.):

	Pr	
0	0.59049	
1	0.32805	
2	0.07290	
3	0.00810	
4	0.00045	← $P(X = 4) = 0.00045$

For Computing Tail Probability

Example: What is the probability that 4 people or less in a random sample of 5 people from this community has the disease?

Identify $n = 5$, $p = .10$, $x = 4$

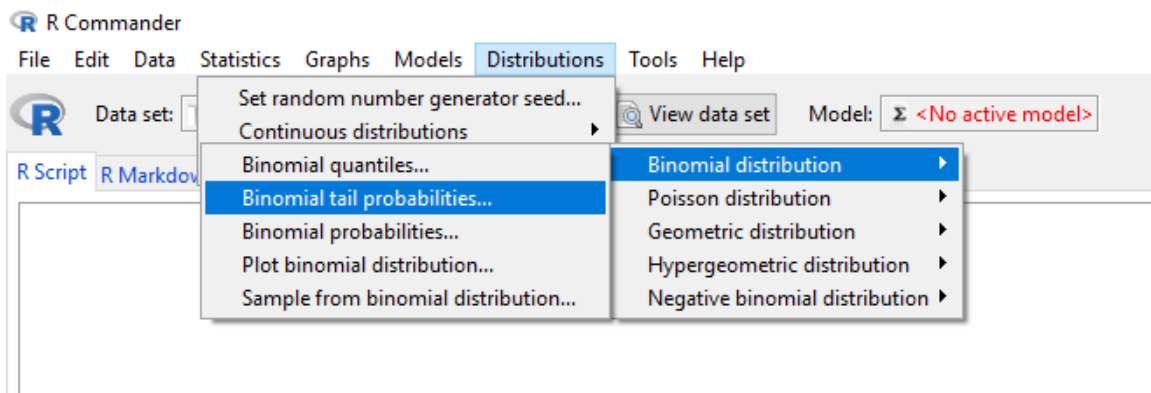
1) To solve this problem perform the following menu selections:

Distributions

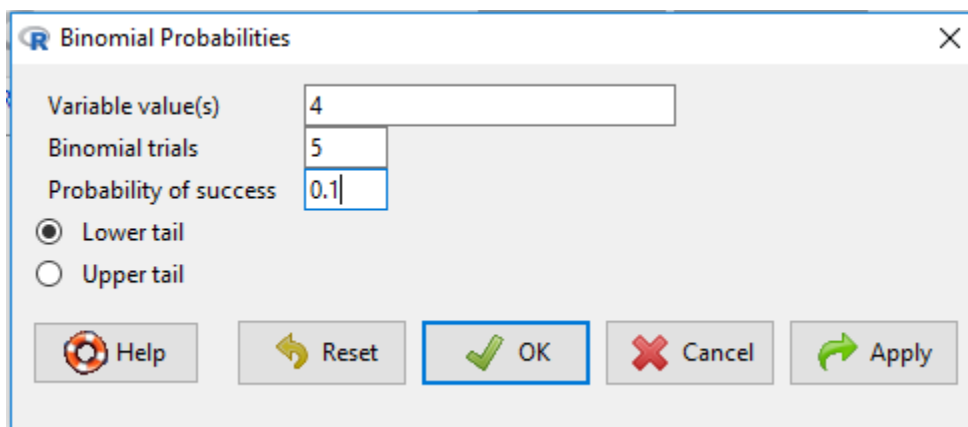
Discrete Distributions

Binomial distribution

Binomial tail probabilities ...



2) Then enter the data in the dialog box for specifying the event, probability of success for each Bernoulli trial and choose whether and choose Lower tail since the probability of 4 or less is to be computed. (If Upper tail is selected, the probability computed would be $P(X > 4) = P(X \geq 5)$.) Click OK.



Result: `> pbinom(c(4), size=5, prob=0.1, lower.tail=TRUE)`
`[1] 0.99999` (So, the probability $P(X \leq 4) = 0.99999$)