Answer on Question #39168 - Math – Statistics

Question: I have seen the demonstration of beta distribution in youtube (https://www.youtube.com/watch?v=3vBBh0SDpqM) at the last B(m,n) is calculated as: (n-1)!(m-1)!/(m+n-1)!.
The question that I ask is:
This last result is obtained for m and n as integers ? if these last ones are réel, what will us obtained for the beta distribution. I suppose that it will gamma distribution but i'm not sure.

Answer: $B(m,n)=\frac{(n-1)!(m-1)!}{(m+n-1)!}$ only for positive integers.

In general, for positive real numbers x and y,

$$B(x,y)=\frac{\Gamma(x)\Gamma(y)}{\Gamma(x+y)},$$

where $\Gamma(x)$ is the gamma function.

You can read about it here:

http://en.wikipedia.org/wiki/Beta_function#Relationship_between_gamma_function_and_beta_function

For gamma function, we have that for natural n, $\Gamma(n)=(n-1)!$. So, substituting this into formula above, we obtain that $B(m,n)=\frac{(n-1)!(m-1)!}{(m+n-1)!}$ (m and n are natural numbers).