

Re: A simple dice rolling problem

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- *From:* "Reef Fish" <large_nassua_grouper@xxxxxxxxxx>
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Jack Tomsky wrote:

You have a fair die, with probability $1/6$ of getting one of the spots 1 to 6.

What is the probability that you'll get 150 or less 6's in 1000 rolls ?

How would YOU find this probability?

— Reef Fish Bob.

Bob, using your formula in terms of the F distribution, I get 0.083689.

You could do better than that. :-)

Actually that is NOT my formula (as you noted below also). It was one of many such formulas that I learned from John Pratt in his 74-page paper (in two parts) in JASA (1968), co-authored with Peizer, who disappeared as soon as he finished that joint paper. :-)

Later when John and I wrote a joint paper using Peizer's result, John even put up some notice in AMSTAT asking if anyone knew where Peizer was. Well, Peizer disappeared without a trace in 1968, probably enjoying himself somewhere in the Caribbean or the South Pacific.

John had about half a dozen "obscure" identities relating the various tails of discrete distributions to F and Chi-square, as well as relating the tails of several continuous distributions.

I had always been bothered by the waste of time I had to spend on

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teaching students how to use the Binomial tables at the back of the book (which are always woefully inadequate), and none of them has $p = 1/6$ for the dice problem. Then there were those normal approximation and Poisson approximations that are also no good, but took up the time that should have been spent on STATISTICS, such as "a mode is not a mean"! :-)

Later, I noticed even the Bible of statistical distributions (John and Kotz; later added Balakrishnan) did not, and STILL does not, have all of those identities spelled out explicitly in my 1978 JASA paper. I couldn't find some of them in the volumes of Encyclopedia of Statistical Science either.

So, finally, in 1992, when the computation of probabilities for continuous distributions are widely available on statistical packages, I suggested to the editor of the American Statistician, Bill Schucany, that a short paper like that should get people off those terrible tables for discrete distributions.

Bill liked the idea so much that he didn't change a single word in my manuscript (the only time ever in my life that happened on first submission), but thought the title of my paper was too dull, and so he suggested something like the actual title for the paper "Just Say No to Binomial (and other Discrete Distributions) Tables".

14 years later, I think most people are STILL unaware of those "obscure" relations, that covered the negative binomial, Pascal, Poisson, and other tails of distributions to the tails of continuous distributions.

Incidentally, the first time I came across that relationship between the binomial and the F was in a Lockheed internal report written by the late Bob Ellison in February 1964. I'm sure that it goes back even further, perhaps to the Middle Ages.

Jack

Not quite the Middle Ages, but far enough back that most people should know by NOW. There are other special identities covering the Binomial tails, fixing n , fixing p , etc., but none as "easy" as the one illustrated.

-- Bob.

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