

## Re: closed form for generating function

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In article <1107210511.586737.93670@f14g2000cwb.googlegroups.com>, hawkmoon269 <rson@new.rr.com> wrote:

| Could someone illustrate the derivation of the closed form for the  
| following generating function?

|  
|  $x / (1-nx)(1-x-x^2)$   
|

| I believe this would be a general form the convolution of the Fibonacci  
| numbers and the powers of n. Thanks in advance.

If you want to find an expression for the coefficient of  $x^m$  in this function, you can do so by expanding  $x/((1-nx)(1-x-x^2))$  in partial fractions. However, if you just want to compute the sum  $F_m + F_{m-1}n + \dots + F_1 n^{m-1}$ , it would probably be easier to replace  $F_m$  by its exponential representation  $(\phi^m - (-\phi)^{-m})/(\phi + 1/\phi)$  and then sum the geometric series.

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