

Re: Help with a recursive equation

Source: <http://sci.tech-archive.net/Archive/sci.math/2007-07/msg00151.html>

- *From:* James Waldby <no@xxxxx>
 - *Date:* Sun, 01 Jul 2007 18:34:33 -0500
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KP wrote:

On Jun 30, 9:25 pm, ...<mensana...@xxxxxxx> wrote:

On Jun 30, 9:17?am, ... <mensana...@xxxxxxx> wrote:

On Jun 30, 3:43?am, KP <silverphoenix...> wrote:

[re $S(n,m) = \sum (k: k \text{ is an } n\text{-bit binary number with } m \text{ 1-bits}) \dots$

$$S(n,m) = S(n-1,m) + (2^{n-1}) * C(n-1,m-1) + S(n-1,m-1)$$

....

[snip code + $S(8,4)$ test run]

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## ok, here's our answer, calculated recursively ## 8925
##
## now, check by actually summing
## the 8 bit numbers that have 4 1-bits (popcount) ## 8925
```

Another verification of $S(8,4)$ is as follows. $S(n,m) + S(n, n-m) = C(n,m) * ((2^n) - 1)$ because for each number with m 1-bits there's a complementary number with $n-m$ 1-bits, so $S(8,4) = C(8,4) * 255 / 2 = 35 * 255 = 8925$.

....

I was looking for any pointers to the closed form solution of the recursion.
Any pointers to methods or links would suffice if not the actual answer.

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-jiw

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