

SOME CONNECTIONS BETWEEN ALGEBRAIC EXPRESSIONS AND SEQUENCES : PART IV

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Match the generating function with the formula for the sequence. With a computer it is usually easy to figure out the generating function with the sequence by using the command `taylor` in Maple or the OLEIS if the entry happens to list the generating function. If you don't have a computer then you will need to use your algebra skills and it is usually easier to go from the sequence to the generating function than the reverse.

- (1) $a_n = 3 \cdot 2^n$
 - (2) $a_n = \binom{n}{2} 2^n$
 - (3) $a_n = \binom{3}{n} 2^n$
 - (4) $a_0 = 17, a_1 = 3, a_2 = -1, a_3 = 12, a_4 = 1, a_5 = -3, a_6 = 1, a_n = 0$ for $n > 6$.
 - (5) $a_0 = 1, a_1 = 3, a_2 = 5, a_3 = 6, a_4 = 5, a_5 = 3, a_6 = 1, a_n = 0$ for $n > 6$.
 - (6) $a_0 = a_k = 1, a_r = 2$ for $1 < r < k, a_n = 0$ for $n > k$
 - (7) $a_n = 2n$
 - (8) $a_n = n^2$
 - (9) $a_n = n^3$
 - (10) $a_n = n^4$
 - (11) $a_n = n(n-1)$
 - (12) $a_n = n(n-1)(n-2)$
 - (13) $a_n = n(n-1) \cdots (n-k+1)$
 - (14) $a_n = n(n+1)$
 - (15) $a_n = n(n+1)(n+2)$
 - (16) $a_n = n(n+1) \cdots (n+k-1)$
 - (17) $a_n = n^2 2^n$
 - (18) $a_n = (n+1) \binom{4}{n}$
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- (a) $3/(1-2q)$
 - (b) $2q/(1-q)^2$
 - (c) $(1-q^2)(1-q^k)/(1-q)^2$
 - (d) $2/(1-q)^3$
 - (e) $(1+2q)^3$
 - (f) $(2q+4q^2)/(1-2q)^3$
 - (g) $(1+5q)(1+q)^3$
 - (h) $2q^2/(1-q)^3$
 - (i) $q^2/(1-2q)^3$
 - (j) $(q+q^2)/(1-q)^3$
 - (k) $(1-q^2)(1-q^3)(1-q^4)/(1-q)^3$
 - (l) $6q^3/(1-q)^4$
 - (m) $6/(1-q)^4$
 - (n) $(q+4q^2+q^3)/(1-q)^4$
 - (o) $(q+11q^2+11q^3+q^4)/(1-q)^5$
 - (p) $17+3q-q^2+12q^3+q^4-3q^5+q^6$
 - (q) $k!q^{k-1}/(1-q)^{k+1}$
 - (r) $k!/(1-q)^{k+1}$