Warm-up (do not turn in): Brualdi #7.18, #7.19, #7.20

Homework: Brualdi #7.15, #7.51, and:

A. Suppose the sequence $a_0, a_1, a_2, \ldots$ has generating function $f(x)$. Find (in terms of $f(x)$) the generating function for

(a) $a_0, a_0 + a_1, a_0 + a_1 + a_2, a_0 + a_1 + a_2 + a_3, \ldots$
(b) $a_0, 0, a_2, 0, a_4, 0, \ldots$
(c) $a_0, 2a_1, 3a_2, 4a_3, 5a_4, \ldots$

B. A set of $n$ identical coins is to be arranged into two rows (where a row may possibly be empty). Each coin can be either heads up or tails up. How many ways is this possible if the first row must have an odd number of heads and the second row must have an even number of heads?

(The order of heads and tails in each row matters.)

C. Show that

$$\sum_{k=0}^{n} \binom{2k}{k} \binom{2n-2k}{n-k} = 4^n.$$ 

(Hint: You may find a problem on a previous homework helpful.)