

### Analysis of Algorithms — Tutorial

#### Problem 9-1

Compute the generating functions of the following series:

1.  $a_n = 2^n + 3^n$
2.  $b_n = (n + 1)2^{n+1}$
3.  $c_n = \alpha^n \binom{k}{n}$
4.  $d_n = n - 1$
5.  $e_n = (n + 1)^2$

#### Problem 9-2

Compute:

$$(a) [z^n] \frac{1}{1+2z} \quad (b) [z^n] \frac{z+1}{z-1} \quad (c) [z^n] \left( \frac{z+1}{z-1} \right)^2 \quad (d) [z^n] \frac{1}{\sqrt[3]{5+z}}$$

#### Homework Assignment 9-1 (10 points)

Find  $[z^n]$  for each of the following ordinary generating functions:

$$(1) [z^n] \frac{1}{(1-3z)^4} \quad (2) [z^n] (1-z)^2 \ln \frac{1}{1-z} \quad (3) [z^n] \frac{1}{(1-2z^2)^2}$$

#### Homework Assignment 9-2 (10 Points)

Compute the corresponding series of the following generating functions:

1.  $A(z) = 3^z$
2.  $B(z) = 1/\sqrt{1-z/2}$
3.  $C(z) = (1+z)/(1-z)$