COT 5507: Analytic Methods in Computer Science
Fall 2014

Assignment 2

Due: 2 Dec 2014, 5 pm.

1. (20 points) Use the generating function manipulations listed in table 334 to derive a closed form expression for the generating function whose coefficient for z^n is defined as follows: $2*2^n + (-1)^{n/2}*3$, when n is even, and $2*2^n$ when n is odd.

2. (20 points) Use the generating function manipulations listed in table 334 to derive a closed form expression for the generating function whose coefficient for z^n is defined as follows: $n(-2)^n$.

3. (20 points) Use the generating function manipulations listed in table 334 to derive a closed form expression for the generating function whose coefficient for z^n is defined as follows: $(2)^{n-1}/n$, when $n>0$, and 0 when $n=0$.

4. (20 points) Solve the following recurrence, using generating functions:
$g_0 = -1/3$, $g_1 = -7/18$, $g_n = (-2/3)\, g_{n-1} + (1/3)\, g_{n-2}$, $n>1$.

5. (20 points) Solve the following recurrence, using generating functions:
$g_0 = 0$, $g_1 = 2$, $g_2 = -6$, $g_n = -3\, g_{n-1} + g_{n-2} + 3\, g_{n-3}$, $n>2$.