

Análise de Algoritmos
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Lista de exercícios 5: Funções Geradoras

1. Avalie

1. $[z^n] \frac{1}{1-2z}$
2. $[z^n] \frac{1}{1+z}$
3. $[z^n] \frac{3}{1+2z}$
4. $[z^n] \frac{z^2}{(1-z)^3}$
5. $[z^n] \frac{z}{(1-z)^2}$
6. $[z^n] \frac{z}{(1-2z)^2}$
7. $[z^n] \frac{z}{1-z} \frac{1}{(1-z)^2}$
8. $[z^n] \frac{z-2z^2}{(1-z)^3}$
9. $[z^n] \frac{1}{(1-3z)^4}$
10. $[z^n] (1-z)^2 \ln \frac{1}{1-z}$
11. $[z^n] \frac{1}{(1-2z^2)^2}$
12. $[z^n] \frac{1}{\sqrt{1-z}} \ln \frac{1}{1-z}$

2. Encontre a FGO das seguintes sequências:

1. $1, 1, \dots, 1, 1, \dots$
2. $0, 1, 3, 6, 10, \dots, k(k+1)/2, \dots, k \geq 0$
3. $0, 1, 3, 6, 10, \dots, k(k-1)/2, \dots, k \geq 1$
4. $-1, -1, 2, 5, 9, \dots, \binom{N}{2} - 1, \dots$
5. $H_1, H_2, H_3, H_4, \dots, H_k, \dots$
6. $H_1, H_1 + H_2, H_1 + H_2 + H_3, H_1 + H_2 + H_3 + H_4, \dots, \sum_{1 \leq j \leq k} H_j, \dots$
7. $H_1, 2H_2, 3H_3, 4H_4, 5H_5, \dots$
8. $0, 1, 0, 1, 0, 1, \dots$
9. $1, 0, 1, 0, 1, 0, 1, \dots$
10. $0, 1, 1/2, 1/3, \dots, 1/k, \dots$
11. $\{2^{k+1}\}_{k \geq 0}$
12. $\{k2^{k+1}\}_{k \geq 0}$
13. $\{kH_k\}_{k \geq 1}$
14. $\{k^3\}_{k \geq 2}$

3. Resolva usando FG:

1. $a_n = 3a_{n-1} - 3a_{n-2} + a_{n-3}$, $a_0 = 0$, $a_1 = 0$, $a_2 = 1$

2. $a_n = 3a_{n-1} - 3a_{n-2} + a_{n-3}$, $a_0 = 0$, $a_1 = 1$, $a_2 = 1$

3. $na_n = (n - 2)a_{n-1} + 2$, $a_1 = 1, n > 1$

4. $na_n = (n + t - 1)a_{n-1}$, $a_0 = 1$, $n > 0$