

Recurrence equations

part 2

THM
(review)

$$p(D)y = 0$$

- If r is a root of $p(D)$ of multiplicity k :
 k solutions: $x^j e^{rx}$ $j=0,1,\dots,k-1$
- Combine these to get general solution.

THM

$$p(N)a_n = 0$$

- If r is a root of $p(N)$ of multiplicity k :
 k solutions: $n^j r^n$ $j=0,1,\dots,k-1$
- Combine these to get general solution.

EG

$$a_{n+3} = 3a_{n+2} - 4a_n$$

$$(N^3 - 3N^2 + 4)a_n = 0$$

characteristic polynomial

roots: $2, 2, -1$

solutions: $2^n, n \cdot 2^n, (-1)^n$

\Rightarrow general solution:

$$a_n = (C_1 + C_2 n) \cdot 2^n + C_3 \cdot (-1)^n$$