22+ A

18+ B

14+ C

1st order

$$a_n = d\,a_{n-1}$$

gen'l solution $a_n = C\,d^n$

2nd order

$$a_n = 2a_{n-1} + 3a_{n-2}$$

Spose $a_n = Cr^n$ is a solution to

$$Cr^n = 2Cr^{n-1} + 3Cr^{n-2}$$

$C \neq 0$

$r \neq 0$

$$r^n = 2r^{n-1} + 3r^{n-2}$$

$$r^2 = 2r + 3$$

$$0 = r^2 - 2r - 3 = (r-3)(r+1)$$

$$r = -1, 3$$

has solutions $a_n = C(-1)^n$

$a_n = D(3)^n$

$$a_n = 2a_{n-1} + 3a_{n-2}$$

gen'l solution

$a_n = C(-1)^n + D(3)^n$ is a solution

check! $C(-1)^n + D(3)^n = 2C(-1)^{n-1} + 2D(3)^{n-1} + 3C(-1)^{n-2} + 3D(3)^{n-2}$

$a_0 = 3$
$a_1 = 5$
} use to solve for C & D

$3 = a_0 = C(-1)^0 + D(3)^0 = C + D$

$5 = a_1 = C(-1)^1 + D(3)^1 = -C + 3D$

$D = 2 \quad C = 1$

Ans $a_n = (-1)^n + 2(3)^n$

$$a_n = 2a_{n-1} + 3a_{n-2}$$

$$0 = a_n - 2a_{n-1} - 3a_{n-2}$$

$$a_n = Cr^n$$

$$0 = Cr^n - 2Cr^{n-1} - 3Cr^{n-2}$$

$$0 = r^2 - 2r - 3$$

characteristic eqn