

HWS Dyn

1. a. ~~$n+4 = n+2$~~ original $\left| \begin{array}{l} + \\ n \\ n+3 \\ n+4 \end{array} \right| \begin{array}{l} n \\ n+4 \\ n+2 \end{array}$

So $a(n+4) + 6a(n) + 5a(n+2) = 0$
 $a(n+4) = -6a(n) - 5a(n+2)$

b. $\underline{a}(n) = \begin{pmatrix} a(n+3) \\ a(n+2) \\ a(n+1) \\ a(n) \end{pmatrix}$

$\underline{a}(n+1) = A \underline{a}(n) \quad A = \begin{pmatrix} 0 & -5 & 0 & -6 \\ 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \end{pmatrix}$

c. i) $a(0)=0, a(1)=2, a(2)=3, a(3)=4$

$\& n=0$
 $a(4) = -6a(0) - 5a(2) = -6 \times 0 - 5 \times 3 = -15$
 $a(4) = -15$

$a(5) = -6a(1) - 5a(3) = 2 \times -6 + 4 \times -5 = -32$

ii) $A^2 = \begin{pmatrix} 0 & -5 & 0 & -6 \\ 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \end{pmatrix} \begin{pmatrix} 0 & -5 & 0 & -6 \\ 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \end{pmatrix} = \begin{pmatrix} -5 & 0 & -6 & 0 \\ 0 & -5 & 0 & -6 \\ 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \end{pmatrix}$

$A^2 \begin{pmatrix} 4 \\ 3 \\ 2 \\ 0 \end{pmatrix} = \begin{pmatrix} -37 \\ 4 \\ 3 \\ 2 \end{pmatrix} \quad a(5) = -37$

2. a.

$$L = \begin{pmatrix} 0 & 1.5 & 0.4 & 0.5 & 0.3 \\ 0.8 & 0 & 0 & 0 & 0 \\ 0 & 0.7 & 0 & 0 & 0 \\ 0 & 0 & 0.6 & 0 & 0 \\ 0 & 0 & 0 & 0.6 & 0 \end{pmatrix}$$

b.

$$\underline{I} = \begin{pmatrix} 100 \\ 40 \\ 80 \\ 70 \\ 60 \end{pmatrix}$$

Evaluate $(L \times L \times \underline{I})$

$$L^2 \underline{I} = \begin{pmatrix} 213.30 \\ 208 \\ 56 \\ 37.8 \\ 28.8 \end{pmatrix}$$

The expected ^{then} number of 3 year olds is 37.8