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Q2 P2

classmate

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a) $X_0 = 1$ * (1 couple) or 1 male

$Z_k^{(m)} = \{0, 1, 2\}$ male child.

X_n population of male children in n^{th} generation

$$X_{n+1} = Z_1 + Z_2 + \dots + Z_{X_n}$$

$$a_0 = \frac{0.1}{\times 0.6} = 0.06 \quad a_1 = \frac{0.4}{\times 0.6} = 0.24 \quad a_2 = \frac{0.5}{\times 0.6} = 0.3$$

~~extinct~~ extinction prob. = d

$$d_m = a_0 + a_1 d_{m-1} + a_2 (d_{m-1})^2$$

~~Q~~ ~~Q~~ mathematically

$$d = 0.06 + 0.24d + 0.3d^2$$
$$0.3d^2 - 0.76d + 0.06 = 0$$

$$d = 0.245, 0.08$$

extinction prob = 0.08

survival prob = $1 - 0.08 = 0.92$

$$b) d_m = a_0 + a_1 d_{m-1} + a_2 (d_{m-1})^2$$

$$a_0 = 0.1 \times 0.8 = 0.08$$

$$a_1 = 0.4 \times 0.8 = 0.32$$

$$a_2 = 0.3 \times 0.8 = 0.24$$

~~0.08~~

~~0.08~~

$$P(\text{extinction}) = 0.08 \times 1 + 0.32 \times 1 + 0.24 \times 1$$

$$= 0.64$$

$$P(\text{survival}) = 1 - 0.64 = 0.36$$