

Numerical Sequences (2.4)

Problem – Some scientists have described the evolution of a kind of small desert mice by the following sequence : U_n represents the number of thousands of mice at the year $2000+n$. To survive the mice have to hide against the desert snake wich eat them up but they don't allways escape ...

$$U_0 = 1 \text{ and } U_{n+1} = f(U_n) \text{ with } f(x) = 0.4x(8 - x) \text{ for } 0 \leq x \leq 8 \quad \therefore \quad U_{n+1} = 0.4U_n(8 - U_n)$$

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| 1. | <i>Draw carefully the graph of the function f.</i> | 6p |
| 2. | <i>Calculate U_1, U_2, U_3.</i> | 2p |
| 3. | <i>Show the construction of the first tems $U_1, U_2, U_3, U_4, U_5, U_6 \dots$ on the graph</i> | 6p |
| 4. | <i>Is the sequence (U_n) monotonous ? (If yes say how).</i> | 2p |
| 5. | <i>Is the sequence (U_n) bounded if yes give the boundaries)</i> | 2p |
| 6. | <i>Is the sequence (U_n) converging towards a finite limit (if yes, give that limit).</i> | 2p |

7.

