



國立交通大學

National Chiao Tung University

Computations for Dynamical Systems

張書銘

交通大學應用數學系

smchang@math.nctu.edu.tw

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Q1. 張偉楨、許尚哲、張竣富

Observe the behavior of the map $3n + 1$.

$$x_{n+1} = \begin{cases} x_n/2 & \text{if } x_n \text{ is even,} \\ 3x_n + 1 & \text{if } x_n \text{ is odd.} \end{cases}$$





Q2. 王定國、吳冠緯、張育慈、林瑜堯

Observe the behavior of tent map with $\mu = 2$.

$$x_{n+1} = f_{\mu}(x_n) = \begin{cases} \mu x_n & \text{for } x_n < \frac{1}{2} \\ \mu(1 - x_n) & \text{for } \frac{1}{2} \leq x_n \end{cases}$$





Q3. 黃士洪、廖玳澔

Observe the behavior of logistic map.

$$x_{n+1} = rx_n(1 - x_n)$$





Q4. 蘇宏恭

Observe the behavior of Hénon map.

$$x_{n+1} = y_n + 1 - ax_n^2,$$

$$y_{n+1} = bx_n.$$





Q5. 王定國、吳冠緯

Observe the behavior of predator-prey map.

$$\begin{cases} \bar{x} &= ax(1-x) - xy \\ \bar{y} &= \frac{1}{b}xy \end{cases}$$



Q7. 王定國、吳冠緯

Observe the behavior of Duffing equation.

$$\dot{u} = v$$

$$\dot{v} = -\omega_0^2 u - \beta u^3 - \delta v + \gamma \cos(\omega t + \phi)$$



Q9. 王定國、吳冠緯

Observe the behavior of Rössler system.

$$\frac{dx}{dt} = -y - z$$

$$\frac{dy}{dt} = x + ay$$

$$\frac{dz}{dt} = b + z(x - c)$$



Q10. 張偉楨

Observe the behavior of Lorenz system.

$$\frac{dx}{dt} = \sigma(y - x)$$

$$\frac{dy}{dt} = x(\rho - z) - y$$

$$\frac{dz}{dt} = xy - \beta z$$