

Chemistry 5850 Summer 2004 Assignment 9

Due: Tuesday, July 20

Weight of this assignment: 16 marks

1. Derive the solution map of the differential equation $\dot{x} = -kx$. Discuss your solution map in relation to the concept of half-life which you encountered in previous chemistry courses. [6 marks]
2. Using xpp, construct a next-amplitude map for the autocatalator

$$\begin{aligned}\dot{a} &= \mu(\kappa + c) - ab^2 - a, \\ \dot{b} &= \frac{1}{\sigma}(ab^2 + a - b), \\ \dot{c} &= \frac{1}{\delta}(b - c); \end{aligned}$$

at the parameter values $\mu = 0.154$, $\kappa = 65$, $\delta = 0.02$ and $\sigma = 0.005$ studied in class. Compare your next-amplitude map to the next-return map shown in the notes. Are they similar? If not, is one likely to be more useful than the other? [10 marks]

You will note that this is the smallest assignment of the term. We've been going pretty fast, and it's time to catch our breath! I will be away at a conference next week. After that, we have just three more regular lectures. We're almost there!