

CS341 SYSTEMS BIOLOGY I

HOMEWORK ASSIGNMENT #12 – READING (THURS NOV 30, 2017)

READING

The goal of this reading assignment is to give you a taste of how sensitivity analysis is used in the literature. The focus of this paper is on the relative effects of different parameters.

Read “Modeling the mammalian circadian clock: Sensitivity analysis and multiplicity of oscillatory mechanisms” by J-C Leloup and A Goldbeter, *J. theor. Biol.*, 2004 (emailed by Stephanie)

- (1) Why do the authors perform the analysis for four sets of parameters? What characterizes each of the sets?
- (2) What are the two types of sensitivity measures that the authors use?
- (3) Bifurcation analysis determines parameter values at which there is a qualitative change in behavior (such as the transition from non-oscillatory dynamics to oscillatory dynamics). Accompanying sensitivity analysis is a bifurcation analysis. Describe Figures 4 through 8. What makes them bifurcation diagrams? What can we learn from them?
- (4) What do the authors mean by “multiplicity of oscillatory mechanisms”?