

Dugga 1, TBMT19, 2014-01-31

Each question gives 3 points. 7 points are required to pass. You have approx. 45 min.

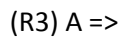
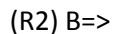
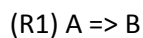
1) Consider the following model, in reaction form



$(x_1(0), x_2(0)) = (2, 3); k_1 = 1, \hat{y} = k_y \cdot x_2, k_y = 1, V_{\max} = 2, K_m = 1$

- What are the states?
- What are the parameters?
- What can be measured?

2) Consider the following set of reactions:



- What are the corresponding differential equations? Assume mass action kinetics for R1 and R2, and Michaelis-Menten kinetics for R3. Don't forget to specify the initial conditions. Specify some values for any parameters you might introduce.
- Expand the model to say that you can measure something that is proportional to the rate of the second reaction, R2.

3) Cost functions

- What is the input and output of a cost function?
- What are the residuals, and how do they relate to the cost function?
- What is the difference between a local and a global optimization algorithm?

Good luck!

Gunnar Cedersund