Dugga 1, TSRT17, 2013-01-23

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

1) Consider the following model, in state-space form

d/dt(x1) = -k1*x1 - k2*x1 + k3

y(t,p) = ky*x1

x1(0) = x0

a) What are the states?
b) What are the parameters?
c) What are the reactions?

2) Consider the following set of reactions:

(R1) A => B

(R2) B=> A

(R3) A =>

a) What are the differential equations? Assume mass action kinetics for R1 and R3, and Michaelis-Menten kinetics for R2. Don't forget to specify the initial conditions. Specify some values for any parameters you might introduce.
b) Add a measurement equation saying that you can measure something that is proportional to the sum of A and B.

3) Cost functions
a) What is the input and output of a cost function?
b) What are the residuals, and how do they relate to the cost function?
c) Why is the standard deviation of the measurement noise used in the expression of the cost function?

Good luck!

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