Omdugga 2015-02-18

All questions give 3 points. Do 1-3 for Omdugga 1, 3-5 for Omdugga 2, 1-5 for both.

7/9 to pass one, 12/15 to pass both. Personal-number, name and Dugga-id on all pages.

1. Consider the following little model:

d/dt([A]) = u – k1\*[A] –k2\*[A]\*[B]

d/dt([B]) = +k1\*[A] – k3

k1 = 1, k2 = 2, k3 = 3, [A](0) = 2, [B](0) = 3, yhat(t,p) = ky\*[A], ky = 4

1. What are the states?, b) What are the parameters? c) What can be measured?
2. a) What is the input and output of a cost function?
3. How does Euler’s forward method for simulation work?
4. What are the residuals in question 1, if y(0) = 3 ?
5. Consider again the model in question 1
6. What are the reactions?
7. What changes if you assume that the k1-reaction has a saturation?
8. Optimization and tests
9. What is the input and output of a global optimization algorithm?
10. What is the null hypothesis of a likelihood ratio test?
11. What happens if you do not reject a chi-square test?
12. Closing the loop
13. A core prediction is tested experimentally, and the experiment shows that a value outside the predicted interval was obtained. What can we then conclude? How would that be different if the prediction was not known to be a core prediction?
14. You have two models that are acceptable given the current data. How can you use predictions to design an experiment that *ensures* that a new experiment will be able to distinguish between the models?
15. What is the point of independent validation data? Why is it beneficial?

Good luck!

Gunnar