
BT 5240 — Computational Systems Biology

Jan–May 2020

Assignment 4

10th April 2020

Due date: 2nd May, 2020 @ 17:00

Maximum marks: 50

Instructions: Late assignments will be penalised¹. If you need any assistance with computing, feel free to approach me. You are allowed to discuss the problems verbally with your friends, but copying (either from your friend or the Web) is not permitted. Mention any collaboration in your solutions. Evaluation will be based on the code(s), the answers and the methodology.

Submission: Since this is a computational assignment, I would also like to look at your codes. Submit your assignment as **one zip file** by uploading it at <http://tinyurl.com/bt5240-submit>. Your zip file should be named something like BTyyBxxx.zip, based on your roll numbers. This zip file must contain a single neatly typeset PDF of your solutions (named BTyyBxxx.pdf) as well as the codes used for each of problems in a separate folder codes.

I. Growth on multiple substrates (20 marks)

Identify synthetic double lethals(genes) for the given metabolic model of *Helicobacter pylori* in the following carbon sources:

1. Only glucose as carbon source
2. Only galactose as the carbon source
3. Both glucose and galactose as the carbon source

Is there a change in the synthetic lethals with change in the carbon source? Comment on the same with biological significance.

II. Studying minimal networks (30 marks)

Identify a minimal 'reactome' for *E. coli* iAF1260. A minimal reactome must be such that the removal of ANY reaction from the network results in a growth rate that is lower than 5% of wild-type growth rate. How can you make your code more efficient?

¹1 second – 24 h: 20%; 24–48 h: 40%; >48h: 60%