

Unit 14 - Week 11

Course outline

How does an NPTEL online course work?

Prerequisite Assignment

MATLAB

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Week 11

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88 - Modelling Gene Regulatory Networks

89 - Lab: Modelling Gene Regulatory Networks

90 - Lab: Modelling Gene Regulatory Networks

91 - Computational Modelling of Host--Pathogen Interactions

92 - Computational Modelling of Host--Pathogen Interactions

93 - Robustness in Biological Systems

94 - Robustness in Biological Systems: Mechanisms

95 - Robustness in Biological Systems: Organising Principles

96 - Robustness in Biological Systems: Trade-offs

Quiz : Practice Assignment 11

Quiz : Assignment 11

Computational Systems Biology : Week 11 Feedback Form

Lecture Materials

Week 12

Download Videos

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Assignment 11

The due date for submitting this assignment has passed.
As per our records you have not submitted this assignment.

Due on 2020-04-15, 23:59 IST.

1) Consider the following Boolean model where A and D are constitutively expressed genes:

2 points

$$\begin{aligned} X^* &= !(A \ \&\& \ B) \\ Y^* &= !(C \ \&\& \ D) \\ B^* &= Y \\ C^* &= X \end{aligned}$$

I. The network exhibits bistability in the expression of gene X if the genes B and C are co-expressed.

II. The network has no point-attractor

Which of the following statements is TRUE?

- Only I
 Only II
 Both I and II
 None are True

No, the answer is incorrect.

Score: 0

Accepted Answers:

Only I

Consider below Boolean model of a gene regulatory network:

$$\begin{aligned} G1^* &= G1 \\ G2^* &= (!(G1) \ \&\& \ G2) \ || \ (G1 \ \&\& \ !(G2)) \\ G3^* &= (!(G2) \ \&\& \ G3) \ || \ (G2 \ \&\& \ !(G3)) \end{aligned}$$

2) Which of the following is a cycle attractor for the above gene regulatory network?

3 points

- G1-G2-G3: 100->110->101->111
 G1-G2-G3: 001->010->011->000
 G1-G2-G3: 101->010->111->000
 G1-G2-G3: 100->101->110->111

No, the answer is incorrect.

Score: 0

Accepted Answers:

G1-G2-G3: 100->110->101->111

3) Which of the following is/are point attractors obtained from above Boolean model?

2 points

- G1-G2-G3: 000
 G1-G2-G3: 001
 G1-G2-G3: 010
 G1-G2-G3: 011

No, the answer is incorrect.

Score: 0

Accepted Answers:

G1-G2-G3: 010

G1-G2-G3: 011

4) Which of the following statements can be inferred from the given Boolean model if initially G2 is expressed, i.e., G2 = 1?

1 point

- When G1 is not expressed, G2 continues to be expressed.
 When G1 is not expressed, G2 is repressed in the next instant
 When G1 is expressed, G2 continues to be expressed
 When G1 is expressed, G2 is repressed in the next instant

No, the answer is incorrect.

Score: 0

Accepted Answers:

When G1 is not expressed, G2 continues to be expressed.

When G1 is expressed, G2 is repressed in the next instant

5) Which of the following statements can be inferred from the given Boolean model?

1 point

- If G2 = 0, G3* = G3.
 If G2 = 1, G3* = !G3
 If G2 = 0, G3* = !G3
 If G2 = 1, G3* = G3

No, the answer is incorrect.

Score: 0

Accepted Answers:

If G2 = 0, G3* = G3.

If G2 = 1, G3* = !G3

6) Which of the following statements are TRUE?

1 point

- Redundancy imparts robustness to a system.
 Robustness leads to improved performance.
 A robust system is fragile against targeted perturbation
 Homeostasis is an example of robustness in biological systems

No, the answer is incorrect.

Score: 0

Accepted Answers:

Redundancy imparts robustness to a system.

A robust system is fragile against targeted perturbation

Homeostasis is an example of robustness in biological systems