

Unit 15 - Week 12

Course outline

How does an NPTEL online course work?

Prerequisite Assignment

MATLAB

Week 1

Week 2

Week 3

week 4

Week 5

Week 6

Week 7

Week 8

Week 9

Week 10

Week 11

Week 12

97 - Robustness and Evolvability

98 - Robustness and Evolvability

99 - Introduction to Synthetic Biology

100 - Advanced Topics

101 - Advanced Topics

102 - Advanced Topics

103 - Course Recap

Quiz : Practice Assignment 12

Quiz : Assignment 12

Computational Systems Biology : Week 12 Feedback Form

Lecture Materials

Download Videos

Text Transcripts

Assignment 12

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

Due on 2020-04-22, 23:59 IST.

1) Which of the following are true about neutral networks?

1 point

- They comprise phenotypes sharing the same genotype
- They comprise genotypes sharing the same phenotype
- They can be used to study robustness
- They can be used to study evolvability

No, the answer is incorrect.
Score: 0

Accepted Answers:

They comprise genotypes sharing the same phenotype
They can be used to study robustness

They can be used to study evolvability

2) What is the maximum number of topologies possible for a 2-node network, given that every pair of nodes have three different types of interactions, activation, repression and no effect? Do not count "disconnected" topologies.

No, the answer is incorrect.
Score: 0

Accepted Answers:

(Type: Numeric) 72

1.5 points

3) Which of the following indicates genotype evolvability?

1 point

- Number of neutral neighbours of a genotype G
- Number of neutral neighbours averaged over all genotypes with a given phenotype P
- Number of different phenotypes found in 1-neighbourhood of a genotype G
- Number of different phenotypes found in 1-neighbourhood of a genotype G

No, the answer is incorrect.
Score: 0

Accepted Answers:

Number of different phenotypes found in 1-neighbourhood of a genotype G

4) Consider two neutral networks A and B having equal number of nodes. Network B has more connected components than Network A, which comprises a single connected component. Which of the following statements is/are true?

1.5 points

- Phenotype corresponding to Network A likely has higher evolvability
- Phenotype corresponding to Network B likely has higher evolvability
- Phenotype corresponding to Network A has higher robustness
- Phenotype corresponding to Network B has higher robustness
- Cannot be concluded with the above information

No, the answer is incorrect.
Score: 0

Accepted Answers:

Phenotype corresponding to Network A likely has higher evolvability
Phenotype corresponding to Network A has higher robustness

5) Consider a space of genotypes consisting of protein sequences of length 40. Which of the following statements will be true, if we represent the genotype space as a network with nodes representing protein sequences and edges representing single amino acid residue mutations?

2 points

- The genotype space has approximately 10^{52} different genotypes
- The genotype space can be represented as a regular graph
- The average degree of a genotype in the space is 760
- The sequences 'Gly₄₀' and 'Gly₃₉Ala' are neighbours in the space
- The sequences 'Gly₄₀' and 'Ala-Gly₃₈-Ala' are neighbours in the space

No, the answer is incorrect.
Score: 0

Accepted Answers:

The genotype space has approximately 10^{52} different genotypes
The genotype space can be represented as a regular graph
The average degree of a genotype in the space is 760
The sequences 'Gly₄₀' and 'Gly₃₉Ala' are neighbours in the space

6) For peptides in the above space, if arginine, alanine, glycine and lysine are present consecutively in positions 24, 25, 26 and 27, then, the peptide exhibits a particular function, no matter what the other amino acids are. If any of these change, the function is lost completely. Can you quantify the (genotype) robustness of the 40-mer peptide Gly₂₃-Arg-Ala-Gly-Lys₁₄?

No, the answer is incorrect.
Score: 0

Accepted Answers:

(Type: Range) 0.89,0.90

3 points