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Courses » Computational Systems Biology

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Unit 8 - Week 4

Course outline

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Week 4

28 - Network Biology: Recap

29 - Lab: Network Models & Perturbations

30 - Lab: Network Models & Perturbations

31 - Reconstruction of Gene Regulatory

Assignment 4

The due date for submitting this assignment has passed.

As per our records you have not submitted this assignment.

Due on 2018-09-05, 23:59 IST.

1) Protein-protein interaction networks are most commonly modelled as

1 point

- ☐ undirected graphs
- ☐ hypergraphs
- ☐ directed graphs
- ☐ cyclic graphs

No, the answer is incorrect.

Score: 0

Accepted Answers:

undirected graphs

2) Consider the following phylogenetic profile for five proteins, across four organisms:

1 point

A	B	C	D	E
1	0	1	0	1
0	1	1	1	0
1	0	1	0	1
0	0	1	1	0

Which of the following statement(s) is/are true?

- ☐ A and D are complementary proteins
- ☐ B and C proteins always occur together but do not participate in the same pathway
- ☐ C is a conserved protein
- ☐ A and E always occur together and are likely required for the functioning of the same pathway

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34 - Reconstruction of Metabolic Networks

Quiz : Assignment 4

Week 4 Feedback

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3) Metabolic networks can be represented with **1 point**

☐ metabolites as nodes, and edges between the metabolites depending on the reactions they participate in
☐ metabolites and reactions as nodes, with edges between metabolite and metabolite, reaction and reaction
☐ metabolites and reactions as nodes, with edges between metabolite and reaction, reaction and metabolite
☐ reactions as nodes, with edges between the reactions based on the common set of metabolites produced by the reactions

No, the answer is incorrect.
Score: 0

Accepted Answers:
metabolites as nodes, and edges between the metabolites depending on the reactions they participate in
metabolites and reactions as nodes, with edges between metabolite and reaction, reaction and metabolite
reactions as nodes, with edges between the reactions based on the common set of metabolites produced by the reactions

4) Consider a toy model with 5 reactions namely R1, R2, R3, R4, R5, of which the reactions **4 points**
 R1, R3, R4 and R5 are found to be essential. The GPRs for each of the reaction is given below:

R1 = gene1 OR gene2
 R2 = NOT (gene2 OR gene3)
 R3 = (gene4 OR gene5) AND (gene1 OR gene3)
 R4 = NOT (gene6)
 R5 = gene5 OR gene7

What is the minimal set of genes that is necessary for the survival of the organism?

☐ gene1
☐ gene2
☐ gene3
☐ gene4
☐ gene5
☐ gene6
☐ gene7

No, the answer is incorrect.
Score: 0

Accepted Answers:
gene1
gene5

5) Which of the following gene networks are directed graphs? **1 point**

☐ Gene-regulatory networks
☐ Co-expression networks
☐ Gene interaction networks
☐ Transcriptional regulatory networks
☐ Gene expression network

No, the answer is incorrect.
Score: 0

Accepted Answers:

*Gene-regulatory networks**Transcriptional regulatory networks*

6) Which of the following statements are true:

1 point

- ☐ Motifs are recurring patterns in networks that occur less frequently than in random networks
- ☐ The number of connections within modules is much larger than the number of connections between modules
- ☐ Most biological systems exhibit modularity
- ☐ Motifs in a network can be independent

No, the answer is incorrect.**Score: 0****Accepted Answers:***The number of connections within modules is much larger than the number of connections between modules**Most biological systems exhibit modularity*

7) How can the reaction graph be constructed from the binarised stoichiometric matrix (S)?

1 point

- ☐ $S \cdot S^T$
- ☐ $S^T \cdot S$
- ☐ $S \cdot S$
- ☐ $S^T \cdot S^T$

No, the answer is incorrect.**Score: 0****Accepted Answers:** $S^T \cdot S$

8) What is the maximum number of edges in a directed graph with n nodes, if there are no self loops?

1 point

- ☐ nC_2
- ☐ n^2
- ☐ $n^2 - n$
- ☐ None of the above

No, the answer is incorrect.**Score: 0****Accepted Answers:** $n^2 - n$

9) We learnt that protein-protein interaction networks are built using different computational methods such as gene neighbourhoods and phylogenetic profiling. Which of the following are true?

1 point

- ☐ Proteins A and B are found to present together in genomes indicating they might be present in the same neighbourhood.
- ☐ Proteins A and B are found to present together in genomes but they might be not be present in the same neighbourhood.

- ☐ Protein P1 and P2 are necessary for growth and contain different domains. In their absence P3 with any one of the domains is sufficient for survival.
- ☐ Coevolution is studied using multiple genomes from the same species.
- ☐ Genomes with P1 show absence of P2 and vice versa. P1 and P2 have the same phylogenetic profile.

No, the answer is incorrect.

Score: 0

Accepted Answers:

Proteins A and B are found to present together in genomes indicating they might be present in the same neighbourhood.

Proteins A and B are found to present together in genomes but they might be not be present in the same neighbourhood.

10) The correct order of the key steps in metabolic reconstruction is:

1 point

- ☐ Gene functional annotations > model construction > model refinement > model simulation > evaluate model
- ☐ Gene functional annotations > model refinement > model simulation > evaluate model > model construction
- ☐ Gene functional annotations > model construction > model simulation > model refinement > evaluate model
- ☐ Gene functional annotations > model refinement > model construction > model simulation > evaluate model
- ☐ Gene functional annotations > model construction > model simulation > evaluate model > model refinement

No, the answer is incorrect.

Score: 0

Accepted Answers:

Gene functional annotations > model construction > model refinement > model simulation > evaluate model

11) Given a stoichiometric matrix S of dimensions $a \times b$

1 point

- ☐ Number of metabolites are b
- ☐ Number of reactions are a
- ☐ Number of reactions are b
- ☐ If \mathbf{v} is the vector of fluxes, $\mathbf{s} \cdot \mathbf{v} = 0$ at steady state
- ☐ Negative values in the matrix signifies reactants for a given reaction

No, the answer is incorrect.

Score: 0

Accepted Answers:

Number of reactions are b

If \mathbf{v} is the vector of fluxes, $\mathbf{s} \cdot \mathbf{v} = 0$ at steady state

Negative values in the matrix signifies reactants for a given reaction

12) Programming assignment: Construct a regular lattice with 100 nodes, where each node is connected to 12 nearest neighbours.

What is the characteristic path length of this lattice? Enter your answer, correct up to 4 decimals.

No, the answer is incorrect.

Score: 0**Accepted Answers:***(Type: Numeric) 4.6364***4 points**

13 Programming assignment: Construct a regular lattice with 100 nodes, where each node is connected to 12 nearest neighbours.

Remove 120 edges at random from this network, and compute the characteristic path length. Enter your answer, correct up to 4 decimals

No, the answer is incorrect.**Score: 0****Accepted Answers:***(Type: Range) 6.05,6.55***4 points**[Previous Page](#)[End](#)