### Week 3 Assessment

The due date for submitting this assignment has passed. **Due on 2017-08-16, 23:59 IST**

As per our records you have not submitted this assignment.

1) What happens to the vector \( \mathbf{v} \) when multiplied with the matrix \( \mathbf{A} \)?

\[
\mathbf{A} = \begin{bmatrix} 0 & 1 \\ -2 & -3 \end{bmatrix}, \quad \mathbf{v} = \begin{bmatrix} 1 \\ 1 \end{bmatrix}
\]

- Magnitude is changed only
- Remains the same
- Only direction changes
- Both magnitude and direction changes

**No, the answer is incorrect.**

**Score: 0**

**Accepted Answers:**
- Both magnitude and direction changes

2) What happens to the vector \( \mathbf{v} \) when multiplied with the matrix \( \mathbf{A} \)?

\[
\mathbf{A} = \begin{bmatrix} 0 & 1 \\ -2 & -3 \end{bmatrix}, \quad \mathbf{v} = \begin{bmatrix} 1 \\ -2 \end{bmatrix}
\]

- Both magnitude and direction changes
- Remains the same
- Only direction changes
- Magnitude is changed only

**No, the answer is incorrect.**

**Score: 0**

**Accepted Answers:**
- Both magnitude and direction changes

3) For a system, \( \mathbf{M} \mathbf{x} = \mathbf{y} \), if \( \mathbf{x} \) and \( \mathbf{y} \) are i)______, then \( \mathbf{x} \) is an ii)______ of \( \mathbf{M} \), and \( |\mathbf{y}|/|\mathbf{x}| \) the iii)______.

- i) eigen vectors, ii) eigen value, iii) collinear.
- i) collinear, ii) eigen vector, iii) eigen value.
- i) eigen values, ii) eigen vector, iii) collinear.
- i) collinear, ii) eigen value, iii) eigen vector.

**No, the answer is incorrect.**

**Score: 0**

**Accepted Answers:**
- i) collinear, ii) eigen vector, iii) eigen value.

4) Tick all the properties of mutation matrix \( \mathbf{Q} \).

- [ ]

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https://onlinecourses-archive.nptel.ac.in/noc17_ch08/unit?unit=18&assessment=57
\[ \sum_{i=1}^{n} q_{ij} = 1 \quad \text{(because all the elements together represent the total sample space).} \]

\[ \sum_{j=1}^{n} q_{ij} = 1 \quad \text{(because all the elements together represent the total sample space).} \]

- All the entries are greater than 1 (because they are probabilities).
- \( q_{ij} \in [0, 1] \), all the entries are between 0 and 1 (because they are probabilities).

No, the answer is incorrect.
Score: 0

Accepted Answers:
- \( q_{ij} \in [0, 1] \), all the entries are between 0 and 1 (because they are probabilities).
- \( \sum_{j=1}^{n} q_{ij} = 1 \) (because all the elements together represent the total sample space).

5) What is the process of information transfer from RNA to Protein called?
- Transliteration
- Transcribing
- Transcription
- Translation

No, the answer is incorrect.
Score: 0

Accepted Answers:
Translation

6) Which of the following is true for the DNA to Protein translation code?
- The RNA triplet combinatorial code does not have a one to one relationship, and thus leads to degeneracy.
- The number of letters in the two languages do not match and hence require a combinatorial code.
- The RNA triplet combinatorial code cannot account for all the known amino acids.
- An RNA doublet combinatorial code can account for all the natural amino acids.

No, the answer is incorrect.
Score: 0

Accepted Answers:
The number of letters in the two languages do not match and hence require a combinatorial code.
The RNA triplet combinatorial code does not have a one to one relationship, and thus leads to degeneracy.

7) What is degeneracy in the genetic code?
- Many different triplet combinatorial codes denoting one amino acid.
- Some triplet codes not denoting any amino acids.
- One triplet combinatorial code coding for many amino acids.
- Many different amino acids corresponding to one triplet code.

No, the answer is incorrect.
Score: 0

Accepted Answers:
Many different triplet combinatorial codes denoting one amino acid.

8) Given a hypothetical sequence made from N alphabets and has length 20, what is the size of the sequence space?
- \( N^{20} \)
- \( 20^{N} \)
- \( 20 \cdot N \)
- None of the choices.
No, the answer is incorrect.
Score: 0

Accepted Answers:

9) Given the sequences, sort them such that each has only one mutation difference between them.

- CAAAGT -> CAAGGT -> TAAGAT -> TAAGAA -> CAAGAT
- CAAAGT -> CAAGGT -> CAAGAT -> CAAAGT -> TAAGAT
- CAAAGT -> CAAGGT -> CAAGAT -> TAAGAT -> TAAGAA
- CAAAGT -> CAAGAT -> TAAGAT -> TAAGAA -> CAAGGT

No, the answer is incorrect.
Score: 0

Accepted Answers:

10) How many other nodes does one node connect to, in the sequence space of a L amino acids long sequence?

- 19L
- 19L⁻¹
- L¹⁹
- 20L

No, the answer is incorrect.
Score: 0

Accepted Answers:

11) For a DNA sequence, calculate the fraction of nodes as neighbours: \( \frac{3L}{4^{L-1}} \), given L = 1 and \( L = 20 \).

5. Comment on the nature of a graph between the fraction vs L.

- 1 and 0.015. As L increases, the fraction of neighbour nodes sharply increases, thus a larger sequence is more densely connected.
- 0.015 and 1. As L increases, the fraction of neighbour nodes sharply increases, thus a larger sequence is more densely connected.
- 0.015 and 1. As L decreases, the fraction of neighbour nodes sharply increases, thus a smaller sequence is more densely connected.
- 1 and 0.015. As L increases, the fraction of neighbour nodes sharply decreases, thus a larger sequence is more sparsely connected.

No, the answer is incorrect.
Score: 0

Accepted Answers:

12) Select examples of beneficial, lethal, neutral, deleterious mutations (in that order), from the list below. Given the starting population has fitness 2.

- 2.5, 1, 2.2, 1
- 10, 0, 3, 0.5
- 3, 0, 2, 1
- 10, 0, 2, -1

No, the answer is incorrect.
Score: 0

Accepted Answers:

13) What is the most common value of fitness on a fitness landscape, and why?
No value can repeat on a fitness landscape.
Negative one, because most sequences do not support life.
Zero, because most sequences are arbitrary and hence are not viable.
One, because most sequences have the same fitness.

No, the answer is incorrect.
Score: 0

Accepted Answers:
Zero, because most sequences are arbitrary and hence are not viable.