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NPTEL

reviewer2@nptel.iitm.ac.in ▼

Courses » Introduction to Evolutionary Dynamics

Announcements **Course** Ask a Question Progress

Unit 6 - Week 5

Week 5 Assessment

The due date for submitting this assignment has passed. **Due on 2017-08-30, 23:59 IST.**
As per our records you have not submitted this assignment.

1) What is the critical value of mutation rate (μ), above which localization of a population around a fitness peak may not happen? ***1 point***

- O (L)
- O (L^{-1})
- O (log L)
- O (L^{2})

No, the answer is incorrect.
Score: 0

Accepted Answers:
O (L^{-1})

2) What type of populations allow easier elimination of one of the genotypes purely by chance? ***1 point***

- Clonal population
- Small populations
- Large populations
- Heterogeneous population

No, the answer is incorrect.
Score: 0

Accepted Answers:
Small populations

3) What is the ultimate outcome of the marbles in a jar game? ***1 point***

- One of the 2 types of marbles will eventually be eliminated.
- The game will continue indefinitely.
- The jar will become empty.
- Equal number of marbles of the 2 types in the jar.

No, the answer is incorrect.
Score: 0

Accepted Answers:
One of the 2 types of marbles will eventually be eliminated.

4) What are the analogies between the marbles in a jar game and bacterial cell division? Tick all correct. ***1 point***

- Selecting any marble is equally likely is analogous to all individuals having the same fitness.
- Picking a marble is analogous to death of an individual in the population.
- Marbles do not change colour is analogous to not allowing mutations in the population.

Week 8

- [ ] Sampling rule – the same individual can be selected for birth and death process is analogous to sampling with replacement.

No, the answer is incorrect.
Score: 0

Accepted Answers:
Sampling rule – the same individual can be selected for birth and death process is analogous to sampling with replacement.
Selecting any marble is equally likely is analogous to all individuals having the same fitness.
Marbles do not change colour is analogous to not allowing mutations in the population.

5) In a Moran process, how can the distribution of population between two genotypes A and B remain unaltered? *1 point*

- [ ] When A is chosen for birth and B is chosen for death.
- [ ] When A is chosen for birth and death.
- [ ] When B is chosen for birth and death.
- [ ] When B is chosen for birth and A is chosen for death.

No, the answer is incorrect.
Score: 0

Accepted Answers:
When A is chosen for birth and death.
When B is chosen for birth and death.

6) While a new mutant tries to establish itself, the probability $P_{i \rightarrow i+1}$ is equal to: *1 point*

- $P_{i \rightarrow i}$
- $P_{i \rightarrow i-1}$
- $2P_{i \rightarrow i-1}$
- $2P_{i \rightarrow i+1}$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$P_{i \rightarrow i-1}$

7) With no selective advantage present what is the probability of one individual replacing all other N-1 individuals in a population during a Moran process? *1 point*

- $\frac{1}{2N}$ Because everyone is equally likely to survive and/or die
- $\frac{1}{N}$ Because everyone is equally likely to survive and/or die
- $\frac{1}{N-1}$ Because everyone is equally likely to survive and/or die
- $\frac{1}{N^2}$ Because everyone is equally likely to survive and/or die

No, the answer is incorrect.
Score: 0

Accepted Answers:
$\frac{1}{N}$ *Because everyone is equally likely to survive and/or die*

8) When different genotypes have different fitness, what is the mathematical expression for probability of choosing i-th for birth and j-th for death? *1 point*

- $\frac{y_i f_i}{\sum y_j f_j} \cdot \frac{y_i}{N}$

$\frac{y_j f_j}{\sum y_i f_i} \cdot \frac{y_j}{N}$

$\frac{y_i f_i}{\sum y_i f_i} \cdot \frac{y_j}{N}$

$\frac{y_j f_j}{\sum y_j f_j} \cdot \frac{y_i}{N}$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$\frac{y_i f_i}{\sum y_i f_i} \cdot \frac{y_j}{N}$

9) The left hand side expression denotes the probability of a single mutant individual with fitness r > 1 going to fixation, given all other individuals have fitness 1. The right hand side denotes the probability of fixation when there is no fitness difference, thus no selection. Tick the correct relationship. ***1 point***

$\frac{1-\frac{1}{r}}{1-\frac{1}{r^N}} [\quad] \frac{1}{N}$

- <, lesser than
- >, greater than
- <=, lesser than equal to
- >=, greater than equal to

No, the answer is incorrect.
Score: 0

Accepted Answers:
>, greater than

10) What is a realistic value of percentage fitness advantage imparted by beneficial mutations? ***1 point***

- 3%
- -2%
- 12%
- 0%

No, the answer is incorrect.
Score: 0

Accepted Answers:
3%

11) Given, fitness of genotype A = 1, fitness of genotype B = 1.05, population of genotype A = 999, population of genotype B = 1. The probability of fixation of genotype B, can be approximated as? ***1 point***

- 5
- 0.05
- 0.005
- 0.5

No, the answer is incorrect.
Score: 0

Accepted Answers:
0.05

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