X

Unit 3 - Week 2

Course outline

How to access the portal?

Week 1

Week 2

- Lecture 6 : Modelling selection – 1
- Lecture 7 : Modelling Selection – 2 : Two species
- Lecture 8 : Modelling Selection – 3 : Two and more species
- Lecture 9 : Modelling Mutations – 1
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- Quiz : Week 2 Assessment
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Week 2 Assessment

The due date for submitting this assignment has passed. Due on 2017-08-09, 23:59 IST.
As per our records you have not submitted this assignment.

1) How to identify the steady states of a function, $\frac{dx}{dt} = f(x)$ graphically? ***1 point***

- The point where the curve is parallel to the X-axis.
- The points where the function's curve intersects the X-axis.
- The points where the function's curve intersects the Y-axis.
- The point where the curve is parallel to the Y-axis.

No, the answer is incorrect.
Score: 0

Accepted Answers:
The points where the function's curve intersects the X-axis.

2) In the logistics growth model, what causes the rate of change of population $(\frac{dN}{dt})$ to increase first and then decrease, as the population (N) increases? ***1 point***

- Lack of space as population increases, limits the growth rate.
- None of the choices.
- Initially there is ample resources for growth, and as population increases, rate of population growth also increases. However, as resources become scare, rate of population growth reduces.
- Toxin accumulation, limits the growth rate.

No, the answer is incorrect.
Score: 0

Accepted Answers:
Initially there is ample resources for growth, and as population increases, rate of population growth also increases. However, as resources become scare, rate of population growth reduces.

3) Is the simple exponential growth model enough to explain real bacterial growth? Why? ***1 point***

- No, since bacteria have not taken over the planet, it is safe to assume, the simple exponential growth model alone cannot explain bacterial growth.
- Yes, since microbes can be found everywhere.
- Yes, because they double every 20 minutes.
- No, if bacteria grew in accordance with simple exponential growth model, they would deplete all available nutrients on earth many times over in less than a week's time.

No, the answer is incorrect.
Score: 0

Accepted Answers:
No, if bacteria grew in accordance with simple exponential growth model, they would deplete all available nutrients on earth many times over in less than a week's time.

4) ***1 point***

Given two species A and B, with population N_A and N_B living in a maximum population carrying capacity K, and X_A and X_B their respective population fractions, such that $X_A + X_B = 1$. What does $\frac{dX_A}{dt} = -\frac{dX_B}{dt}$ imply and what is its consequence?

- The rate of change of X_A is equal in magnitude but opposite in sign to the rate of change of X_B. As a result, when X_A rises X_B falls, and vice versa.
- None of the choices.
- Since the sum of X_A and X_B should be constant, rise in one implies decline in the other.
- The net sum of rate of change of X_A and rate of change of X_B is zero. Thus, when X_A is positive then X_B is negative.

No, the answer is incorrect.
Score: 0

Accepted Answers:
The rate of change of X_A is equal in magnitude but opposite in sign to the rate of change of X_B. As a result, when X_A rises X_B falls, and vice versa.
Since the sum of X_A and X_B should be constant, rise in one implies decline in the other.

5) What is φ defined as? ***1 point***

- $\varphi = \frac{(aN_A + bN_B)}{K}$
- $\varphi = aX_B + bX_A$
- Mean fitness of the population.
- φ is the mathematical constraint on the rate of change of population fractions of different species in a population, such that the total population does not exceed the carrying capacity.

No, the answer is incorrect.
Score: 0

Accepted Answers:
Mean fitness of the population.
φ is the mathematical constraint on the rate of change of population fractions of different species in a population, such that the total population does not exceed the carrying capacity.
$\varphi = \frac{(aN_A + bN_B)}{K}$

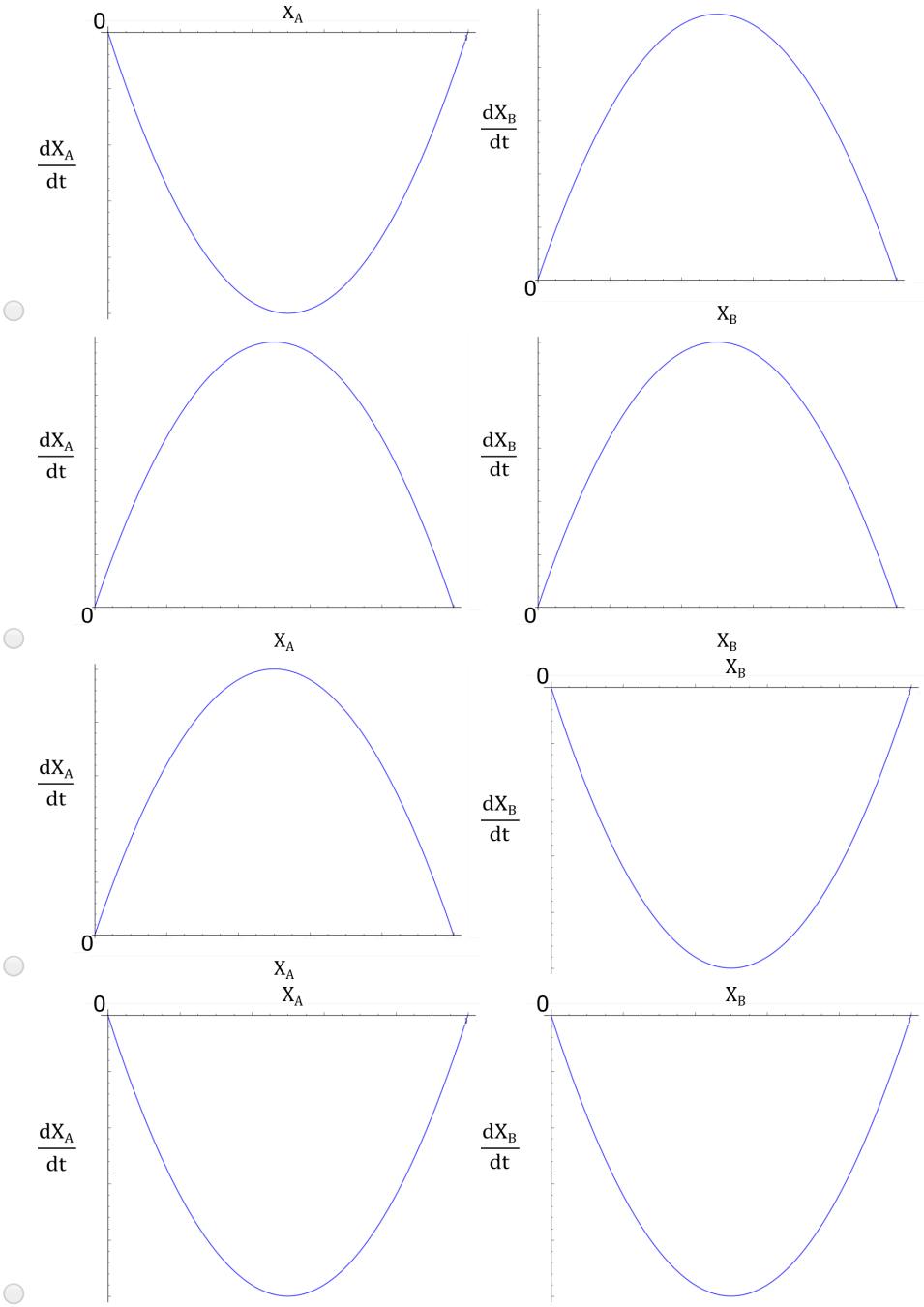
6) For two living species what do the following relations among growth rates a and b imply? ***1 point***
$i)\ a > 0, b > 0$ and $ii)\ a \neq b$

- A positive valued growth rate implies that the two species do not have the ability to reproduce. The difference in the growth rates implies different rates of reproduction.
- A positive valued growth rate implies that the two species are dead. The difference in the growth rates implies different rates of reproduction.
- A positive valued growth rate implies that the two species are living and have the ability to reproduce. The difference in the growth rates implies different rates of reproduction.
- A positive valued growth rate implies that the two species are living and have the ability to reproduce. The difference in the growth rates implies different number of progenies produced.

No, the answer is incorrect.
Score: 0

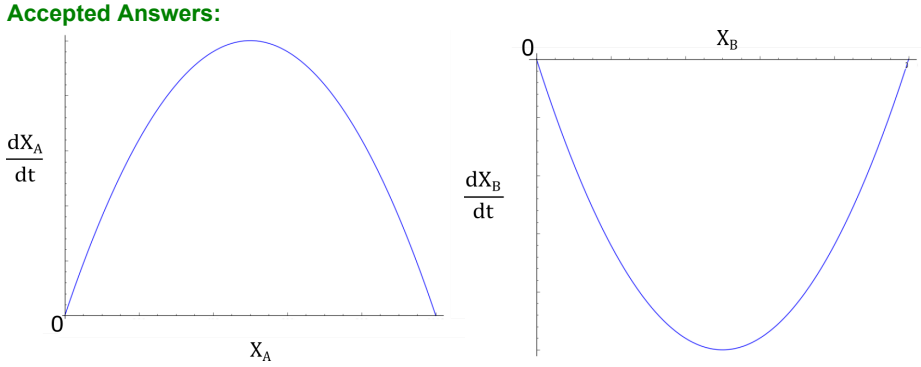
Accepted Answers:
A positive valued growth rate implies that the two species are living and have the ability to reproduce. The difference in the growth rates implies different rates of reproduction.

7) The growth rates of genotype A and B – a and b respectively. When a > b, select the correct pair of graphs that depict the dynamics of $\frac{dX_A}{dt}$ vs X_A, and $\frac{dX_B}{dt}$ vs X_B. ***1 point***



No, the answer is incorrect.
Score: 0

Accepted Answers:



8) What is the difference between Horizontal Gene Transfer and Vertical Gene Transfer? Tick all correct. ***1 point***

- Horizontal transfer can occur between organisms who may or may not share a genetic relationship, but Vertical transfer is transfer of genes from one generation to another.
- Parents pass their genes to their progeny by Vertical transfer. Individuals share their genes with each other via Horizontal transfer.

Vertical transfer is between organisms who may not share any genetic relationship, but Horizontal transfer is transfer from parent to progeny.

Parents pass their genes to their progeny by Horizontal transfer. Individuals share their genes with each other via Vertical transfer.

No, the answer is incorrect.
Score: 0

Accepted Answers:
Horizontal transfer can occur between organisms who may or may not share a genetic relationship.
Vertical transfer is transfer of genes from one generation to another.
Parents pass their genes to their progeny by Vertical transfer. Individuals share their genes with each other via Horizontal transfer.

9) What is mutation rate? Define its unit. ***1 po***

It is the error in reading the DNA code, by the ribosome during translation. Unit is genome/generation.

It is the error in reading the DNA code, by the ribosome during translation. Unit is generation/genome.

It is the error in copying the DNA code by DNA polymerase during replication. Unit is genome^{2}generation^{-2}.

It is the error in copying the DNA code by DNA polymerase during replication. Unit is genome^{-1}generation^{-1}.

No, the answer is incorrect.
Score: 0

Accepted Answers:
It is the error in copying the DNA code by DNA polymerase during replication. Unit is genome^{-1}generation^{-1}.

10) Which property of equilateral triangle makes it ideal to represent the dynamics of 3 species? ***1 point***

The sides are of equal length.

Sum of perpendicular distances from any point inside the triangle to the three sides is a constant.

The angular bisectors are of equal length.

The medians have equal length.

No, the answer is incorrect.
Score: 0

Accepted Answers:
Sum of perpendicular distances from any point inside the triangle to the three sides is a constant.

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