Takehome Exam 9 Answers

Question 1.

True or False - Constructive Neutral Evolution (CNE) emphasizes adaptive mechanisms of evolution

True

False

Question 2.

True or False - According to the modern synthesis mutations play little to no role in directing the evolution of organisms; selective processes play the main role in evolution. (Apparently huskyCT has the wrong answer for this)

True

False

Question 3.

You want to find all copies of a transposase gene in a particular microbial genome. A blastp search of the annotated genome resulted in 12 significant hits. A PSI-blast search of the annotated genome using a PSSM calculated from first searching nr for 5 generations resulted in 16 significant matches. A PSI-blast search of the 6 frame translation of the genome gives 42 significant matches. 1) Explain why there are additional matches obtained in PSI blast searches.

PSI blast search of the annotated proteins detects divergent homologs of the query sequence

A PSI-blast search of the 6 frame translation detects decaying genes that no longer have a continuous open reading frame

Question 4.

For which of the following algorithm used to find homologous protein sequences in a databank do you expect most false negatives?

PSI Blast

HMMER

blastp

Question 5.

For which of the following algorithm used to find homologous protein sequences in a databank do you expect most false negatives?

tblastn

blastp

PSIblast

blastn

Question 6.

For which of the following algorithm used to find homologous protein sequences in a databank do you expect more false positives?

tblastn

blastp

PSIblast

blastn

Question 7.

Mutations occur at random and therefore do not provide any direction.

True

False

Question 8.

Random interactions between two macromolecules lower the overall free energy,

this prevents destabilizing mutations from occurring.

this is prevented by chaperons binding to proteins, preventing random interactions.

this allows destabilizing mutations to occur and be fixed through drift.

Question 9.

The DNA polymerase in many cynaobacteria is encoded in two fragments that are synthesized separately, and then joined via a split intein.

The widespread occurrence of this split intein reflects

that the intein has become an essential part of making a functioning DNA polymerase

that the DNA polymerase synthesized from the two fragments works better than the ancestral enzyme made from a single transcript.

a likely example of constructive neutral evolution

Question 10.

check all statements that are correct

coalescence is the process of tracing lineages backwards in time to their common ancestors

In many coalescence processes that consider many individuals, the coalescence of the the last two lineages takes about 1/2 the time of the overall coalescence process

If in species evolution every speciation event is accompanied by an extinction event (the overall number of species is constant), we would expect a dramatic radiation at the base of the phylogeny that considers only the lineages that end in extant species.

Catastrophic extinction events are often followed by radiations, because many different ecological niches are available for the survivors to adapt to.

Question 11.

Which of the following provides an approximate measure for the optimal growth temperature of an organism.

The percent GC pairs in the ribosomal RNA

The percent GC pairs in the stem regions of the ribosomal RNA

The percent of purine nucleotides in the ribosomal RNA

The frequency of the amino acids I V Y W R E L

Question 12.

Reconstruction of ancestral nucleotide and protein sequences suggest

that the Last Universal Common Ancestor was an extreme thermophile

That the ancestors of the archaeal and bacterial domains were thermophiles

That the ancestors of the archaeal and bacterial domains lived at higher temperatures than the Last Universal Common Ancestor