Assignment 4

The due date for submitting this assignment has passed. As per our records you have not submitted this assignment.

1) Consider the influence graph shown below, it depicts a closed ecosystem. Do not impose any more conditions (from nature) on this graph. Keep it simple.

- Grass has direct influence on Lions
- Grass has indirect influence on Lions
- Bacteria has direct influence on Fungi
- Bacteria has indirect influence on Fungi
- Hawk has direct influence on Fungi
- Hawk has only indirect influence on Fungi
- There is at least one node in the graph that is not (directly or indirectly) influenced by any other node

No, the answer is incorrect.
Score: 0
Accepted Answers:
- Grass has indirect influence on Lions
- Bacteria has direct influence on Fungi
- Bacteria has indirect influence on Fungi
- Hawk has direct influence on Fungi
- Hawk has direct influence on Fungi

2) In Week 4, a famous study on creating virtual creatures using genetic algorithms was discussed and the following web resources were listed in the lecture.

- Pirouette - Evolved Virtual Creature, https://www.youtube.com/watch?v=GS18h_h6IM

The fitness vs time (generation number) from the 2nd web resource is reproduced here.
What can you say about this plot?

- the plot is generated from a small population
- the fitness function maximizes the net upward movement
- there is a general upward trend but often the fitness drops and recovers and improves
- at around 1,300th generation (shown by the arrow) the fitness jumps because a different fitness function was used

No, the answer is incorrect.
Score: 0
Accepted Answers:
the plot is generated from a small population
the fitness function maximizes the net upward movement
there is a general upward trend but often the fitness drops and recovers and improves
at around 1,300th generation (shown by the arrow) the fitness jumps because a different fitness function was used

3) The following articles (freely available) are from the first web resource listed in the previous question.

Evolving Virtual Creatures

Evolving 3D Morphology and Behavior by Competition

Three figures from the first article are reproduced here.

What do these figures illustrate?

- Virtual creatures that have evolved to jump
- Virtual creatures that have evolved to walk
- Virtual creatures that have evolved to swim
- Model of robots sketched by an artist
Prototype of robots designed by an engineer
No, the answer is incorrect.
Score: 0
Accepted Answers:
Virtual creatures that have evolved to jump
Virtual creatures that have evolved to walk
Virtual creatures that have evolved to swim

4) The idea of using population based methods to solve optimization problems  
   - is only to exploit parallel search like in Iterative Hill Climbing
   - is to hope that one of the parallel Simulated Annealing searches will find the solution
   - is to go beyond parallelism and exploit interaction between members of the population
   - is to exploit the diversity in a population of candidates and try mixing up the candidate solutions
   No, the answer is incorrect.
   Score: 0
   Accepted Answers:
   is to go beyond parallelism and exploit interaction between members of the population
   is to exploit the diversity in a population of candidates and try mixing up the candidate solutions

5) Which of the following are true? Mark all correct answers
   - Genetic Algorithms work with a population of problem solving agents
   - Genetic Algorithms work with a population of candidate solutions
   - Ant Colony Optimization works with a population of problem solving agents
   - Ant Colony Optimization works with a population of candidate solutions
   No, the answer is incorrect.
   Score: 0
   Accepted Answers:
   Genetic Algorithms work with a population of candidate solutions
   Ant Colony Optimization works with a population of problem solving agents

6) Genetic Algorithms work best when
   - there is a large population of diverse candidates
   - there is a large population of similar candidates
   - there is a small population of diverse candidates
   - there is a small population of similar candidates
   No, the answer is incorrect.
   Score: 0
   Accepted Answers:
   there is a large population of diverse candidates

7) Darwin's theory of natural selection can be seen as
   - a process of selecting the best leader based on their education
   - a process of selecting the best leader based on their ability to tell lies
   - a process to design life forms that evolve and improve over generations
   - a process where members of a population compete for survival
   No, the answer is incorrect.
   Score: 0
   Accepted Answers:
   a process to design life forms that evolve and improve over generations
   a process where members of a population compete for survival

8) Which one of the following completes the quote from Paul Valery in the context of Genetic Algorithms? “It takes two to invent anything. The one makes up combinations, ________________.”
   - the other creates the permutations
   - the other chooses
   - the other sorts the components
   - the other randomizes them
   No, the answer is incorrect.
   Score: 0
   Accepted Answers:
   the other chooses

9) The single point crossover can be used to solve the TSP problem if the representation is
   - the path representation
   - the ordinal representation
   - the adjacency representation
   - none of the above
   No, the answer is incorrect.
   Score: 0
   Accepted Answers:
   the ordinal representation

10) Conway's Game of Life is
   - a video battle game between two persons
11) When Christof Koch said “The most complex object in the known universe” he was referring to

- the Cray supercomputer
- the Mars Rover
- a formula One car
- the human brain

No, the answer is incorrect.
Score: 0
Accepted Answers:
the human brain

12) What is the role an individual ant plays in the Ant Colony Algorithm?

- It conveys the messages from the queen to the soldiers
- It constructs a candidate solution using divide and conquer approach
- It constructs a candidate solution using a greedy stochastic search approach
- It guards the entrance of the ant colony

No, the answer is incorrect.
Score: 0
Accepted Answers:
It constructs a candidate solution using a greedy stochastic search approach

BEGIN GROUP

A tour is shown in the figure, where the edges are bidirectional. Use A, B, C, D, E, F, G, H, I, J as the reference sequence (index sequence) for preparing ordinal representation and adjacency representation.

13) Which of the following are valid path representations of the tour shown in the figure?

- A, F, E, J, B, G, D, I, C, H, A
- A, F, E, J, B, G, D, I, C, H
- A, F, E, B, J, D, G, I, C, H
- I, C, H, A, F, E, J, B, G, D
- I, D, G, B, J, E, F, A, H, C
- E, F, A, H, C, I, D, G, B, J

No, the answer is incorrect.
Score: 0
Accepted Answers:
A, F, E, J, B, G, D, I, C, H
I, C, H, A, F, E, J, B, G, D
I, D, G, B, J, E, F, A, H, C
E, F, A, H, C, I, D, G, B, J

14) Which of the following are valid adjacency representations of the tour shown in the figure?

- A, B, C, D, E, F, G, H, I, J
- F, G, H, I, J, E, D, A, C, B
- F, G, H, I, J, A, D, E, C, B
- H, J, I, G, F, A, B, C, D, E
- None of the above

No, the answer is incorrect.
Score: 0
Accepted Answers:
F, G, H, I, J, E, D, A, C, B
H, J, I, G, F, A, B, C, D, E

15) Question 13 lists many path representations of the tour shown in the figure. Which of the following are the ordinal representations of the valid path representations in question 13?
16) The path representation of two tours are given below. Generate offsprings using Partially Mapped Crossover between P1 and P2 and use locations from 4 to 7 (including 4 and 7) as the mapping segment.

**P1:** A,F,E,J,B,G,D,I,C,H
**P2:** B,D,G,I,H,C,F,J,E,A

Enter one of the resulting child tours in the textbox. Use path representation (comma separated list of city labels) without extraneous characters like spaces, period, parenthesis, etc.

No, the answer is incorrect.
Score: 0
Accepted Answers:
- (Type: String) H,F,C,J,B,G,D,I,E,A

1 point

17) The path representation of two tours are given below. Generate offsprings using Order Crossover between P1 and P2 and use locations from 4 to 7 (including 4 and 7) as the mapping segment. In the child tour, place the mapping segment in the last part of the tour. For example, C1 = ?, ?, ?, ?, ?, ?, J, B, G, D

**P1:** A,F,E,J,B,G,D,I,C,H
**P2:** B,D,G,I,H,C,F,J,E,A

Enter one of the resulting child tours in the textbox. Use path representation (comma separated list of city labels) without extraneous characters like spaces, period, parenthesis, etc.

No, the answer is incorrect.
Score: 0
Accepted Answers:
- (Type: String) I,H,C,F,E,A,J,B,G,D
- (Type: String) A,E,J,B,G,D,I,H,C,F

1 point

18) The path representation of two tours are given below. Generate offsprings using Cycle Crossover between P1 and P2. Inherit odd cycles from one parent and even cycles from the other parent to create the offsprings.

**P1:** A,F,E,J,B,G,D,I,C,H
**P2:** B,D,G,I,H,C,F,J,E,A

Enter one of the resulting child tours in the textbox. Use path representation (comma separated list of city labels) without extraneous characters like spaces, period, parenthesis, etc.

No, the answer is incorrect.
Score: 0
Accepted Answers:
- (Type: String) A,D,E,I,B,G,F,J,C,H
- (Type: String) B,F,G,J,H,C,D,I,E,A

1 point

19) The path representation of two tours are given below. Compute the ordinal representations of the parent tours. Use single point (mid point) crossover to generate offsprings.

**P1:** A,F,E,J,B,G,D,I,C,H
**P2:** B,D,G,I,H,C,F,J,E,A

Enter one of the resulting child tours in the textbox. Use ordinal representation (comma separated list of numbers) without extraneous characters like spaces, period, parenthesis, etc.

No, the answer is incorrect.
Score: 0
Accepted Answers:
- (Type: String) 1,5,4,7,1,2,3,3,2,1
20) Taking the answers from the previous question, convert the offsprings from ordinal representation to path representation.

Enter one of the resulting child tours in the textbox. Use path representation (comma separated list of city labels) without extraneous characters like spaces, period, parenthesis, etc.

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: String) A,F,E,J,B,D,H,I,G,C
(Type: String) B,D,G,I,H,E,C,J,A,F