COMP 5660/6660/6666 Fall 2020 Exam 2 - Canvas Quiz

This is a closed-book, closed-notes exam. The sum of the max points for all the questions is 56, but note that the max exam score will be capped at 54 (i.e., there are 2 bonus points, but you can't score more than 100%). You have exactly 50 minutes to complete this exam. Keep your answers clear and concise while complete. Good luck!

1. "Blind Parameter Control" is a better name for the class of parameter control mechanisms named "Deterministic Parameter Control" in the textbook because that class: [4 pts]

   (a) includes stochastic mechanisms

   (b) does not use any feedback from the evolutionary process

   (c) avoids biasing against dissimilar individuals in the population

   Select one of:

   - a
   - b
   - c
   - a and b
   - a and c
   - b and c
   - a, b, and c
   - none of a, b, nor c

2. Genetic drift is caused by: [4 pts]

   (a) finite population size

   (b) uncorrelated self-adaptive mutation

   (c) panmictic mixing

   (d) stochastic survival selection

   Select one of:

   - a
   - b
   - c
   - d
   - a and b
   - a and c
   - a and d
   - b and c
   - b and d
   - c and d
   - a, b, and c
   - b, c, and d
   - a, b, c, and d
   - none of a, b, c, nor d

3. In Fitness Sharing: [4 pts]

   (a) new individuals replace similar population members, resulting in the population sharing the niches equally

   (b) the fitness of individuals immediately prior to selection is adjusted according to the number of individuals falling within some prespecified distance of each other

   (c) individuals share the fitness of similar population members immediately prior to selection, resulting in the number of individuals per niche being dependent on the niche fitness

   Select one of:

   - a
   - b
   - c
   - a and b
   - a and c
   - b and c
   - a, b, and c
   - none of a, b, nor c

4. Speciation is: [4 pts]

   (a) when geographically separated sub-populations of a species adapt to their local environmental niches to the extent that they become mating-incompatible

   (b) when geographically separated sub-populations of a species adapt to their local environmental niches to the extent that they become mating-compatible

   (c) when sub-populations of different species in the same local environmental niche adapt homogeneously to the extent that they become mating-incompatible

   (d) when sub-populations of different species in the same local environmental niche adapt homogeneously to the extent that they become mating-compatible

   Select one of:

   - a
   - b
   - c
   - d
   - a and c
   - a and d
   - b and c
   - b and d
   - none of a, b, c, nor d

5. In Diffusion Model EAs: [4 pts]

   (a) individuals are modeled by diffusion equations and only panmictic mating is permitted
   (b) individuals are modeled by diffusion equations and mating is restricted to demes
   (c) the population is conceptually distributed on a grid and only panmictic mating is permitted
   (d) the population is conceptually distributed on a grid and mating is restricted to demes

   Select one of:

   - a
   - b
   - c
   - d
   - a and c
   - b and d
   - none of a, b, c, nor d

6. There is no recombination in "standard" Evolutionary Programming (EP) because: [4 pts]

   (a) extensive research has shown that the use of recombination is counterproductive in EP
   (b) EP was conceived before the invention of recombination
   (c) each individual in "standard" EP is viewed as the abstraction of a species

   Select one of:

   - a
   - b
   - c
   - none of a, b, nor c

7. In Multi-Objective problems a solution x is said to be dominated by a solution y when: [4 pts]

   (a) solution x is no better than y in all objectives
   (b) solution x is strictly worse than y in no more than one objective
   (c) only if both the above are true

   Select one of:

   - a
   - b
   - c
   - none of a, b, nor c

8. In Multi-Objective EAs employing levels of non-domination, a decrease in the number of levels, generally will: [4 pts]

   (a) not impact the amount of selective pressure

   (b) increase the amount of selective pressure

   (c) decrease the amount of selective pressure

   (d) either increase or decrease the amount of selective pressure, depending on the number of conflicting objectives

   Select one of:

   - a
   - b
   - c
   - d
   - none of a, b, c, nor d

9. The Limiting Cases in the Greedy Population Sizing EA (GPS-EA) are those instances when: [4 pts]

   (a) both populations are stuck in a local optimum and the average fitness of the larger population is higher than the average fitness of the smaller population

   (b) the larger population is stuck in a local optimum but the average fitness of the smaller population is larger than the average fitness of the larger population

   (c) both populations are stuck in a local optimum and the average fitness of the larger population is lower than the average fitness of the smaller population

   Select one of:

   - a
   - b
   - c
   - none of a, b, nor c

10. Which of the following EA constraint satisfaction methods inherently reduce the effective search space: [4 pts]

    (a) Penalty Function

    (b) Repair Function

    (c) Closed Feasible Solution Space

    (d) Feasible Decoder

    Select one of:

    - a
    - b
    - c
    - d
    - a and b
    - a and c
    - a and d
    - b and c
    - b and d
    - c and d
    - a, b, and c
    - a, b, and d
    - a, c, and d
    - b, c, and d
    - a, b, c, and d
    - none of a, b, c, nor d

11. Say for the Light Up Puzzle, you want to simultaneously maximize cells lit up while minimizing number of bulbs placed. You execute a multi-objective EA and the final population contains the solutions listed in the following table, where higher coverage indicates more cells lit up, and higher efficiency indicates lower number of bulbs placed:

ID	Coverage	Efficiency
1	8	2
2	4	1
3	2	3
4	1	2
5	9	1
6	4	7
7	2	5
8	1	3
9	10	7
10	5	5

(a) List for each element which elements it dominates; indicate elements with their IDs. [4]

(b) Show the population distributed over non-dominated levels like some multi-objective EAs employ, after each addition of an element, starting with element 1 and ending with element 10 increasing the element number one at a time; indicate elements with their IDs. So you need to show ten different population distributions, the first one consisting of a single element, and the last one consisting of ten elements. [12]