Multiple Choice Questions - Circle the letter indicating your choice

1. In an arbitrary multimodal problem there are: [1]
   (a) a single local optimum and multiple global optima
   (b) no local optima but multiple global optima
   (c) multiple local optima but no global optimum
   (d) none of the above

2. Mutation has the potential to modify an individual’s: [1]
   (a) genotype
   (b) phenotype
   (c) alleles
   (d) all of the above

3. Which is the odd one out: [1]
   (a) Uniform mutation
   (b) Creep mutation
   (c) Random resetting mutation
   (d) Bit-flipping mutation

4. Pleitropy is defined as: [1]
   (a) one gene affects a single phenotypic trait
   (b) one gene affects multiple phenotypic traits
   (c) multiple genes affect a single phenotypic trait
   (d) multiple genes affect multiple phenotypic traits

5. To increase selective pressure for an EA employing tournament parent selection one can: [2]
   (a) decrease the tournament size used in parent selection
   (b) switch from truncation survivor selection (i.e., deterministically replacing the worst individuals)
      to an elitist stochastic survivor selection
   (c) both of the above
   (d) none of the above

6. To decrease the chance of premature convergence one can: [2]
   (a) increase the selective pressure
   (b) decrease the population size
   (c) increase the mutation rate
   (d) decrease the recombination rate
Regular Questions

7. List four ways to initialize the start population of an EA. [4]
   (a)
   (b)
   (c)
   (d)

8. List four termination criteria for an EA. [4]
   (a)
   (b)
   (c)
   (d)

9. List three pros of EAs. [3]
   (a)
   (b)
   (c)
10. List three cons of EAs. [3]
   (a) 
   (b) 
   (c) 

11. (a) What are gray codes? [3]
   (b) What is the advantage of gray codes for bit string representation in a GA? [4]
   (c) What is the gray code for the binary number 01011001? [4]
   (d) What is the binary number encoded by the gray code 01011001? [4]

12. Given the following two parents with permutation representation:
   \( p_1 = (925483716) \)
   \( p_2 = (629138745) \)
   (a) Compute the PMX as specified in your textbook, using crossover points between the 3rd and 4th loci and between the 7th and 8th loci. [5]
   (b) Compute the Edge Crossover as specified in your textbook, except that for each random choice you instead select the lowest element. [5]
   (c) Compute the Cycle Crossover as specified in your textbook. [5]