1. A queue is an example of a/an
   (a) Data structure method
   (b) Algorithm
   (c) Abstract data type

2. Performing exactly 100 constant time operations in sequence is itself a constant time operation.
   (a) True
   (b) False

3. What is the asymptotic runtime class for the following algorithms in the specified cases? Use the big-O notation.
   (a) Linear search of an array of size n, best case

   (b) Linear search of an array of size n, worst case

   (c) Binary search of an array of size n, best case

   (d) Binary search of an array of size n, worst case

4. Below are functions describing the number of constant time operations of different algorithms, as a function of problem size, N. For each function, select the asymptotic runtime class (big O class) that it belongs to.
   (a) $N^3 + 4N$
   (b) $2^{10} + 2N\log N$
   (c) $N(5N + \log N)$
   (d) N^3+2^N

5. What is the asymptotic worst-case runtime class for the following algorithm in the worst case? Use the big-O notation. *Assume that n is a positive integer.*

```
algA1(int n){
   if (n == 1) {
      print("It is done");
   } else {
      algA1(n/2);
   }
}
```

6. What is the asymptotic worst-case runtime class for the following algorithm? Use the big-O notation. *Assume that n is a positive integer.*

```
int n = A.length;
for (int i = 0; i < n; i++) {
     for (int j = 0; j < n; j++) {
     sum = 0;
     for k = 0; k < n; k++)
           sum = sum + A[i][k]*B[k][j];
     C[i][j] = sum;
  }
}
```

7. Consider sorting the array [8, 4, 1, 6, 3] in ascending order. After the very first swap when running insertion sort on it, what will the contents of the array be?
   (a) [1, 4, 8, 6, 3]
   (b) [8, 4, 1, 3, 6]
   (c) [1, 3, 4, 6, 8]
   (d) [4, 8, 1, 6, 3]
   (e) None of the above

8. Consider sorting the array [8, 4, 1, 6, 3] in ascending order. After the very first swap when running selection sort on it, what will the contents of the array be?
   (f) [1, 4, 8, 6, 3]
   (g) [8, 4, 1, 3, 6]
   (h) [1, 3, 4, 6, 8]
   (i) [4, 8, 1, 6, 3]
   (j) None of the above