BRONX COMMUNITY COLLEGE

of The City University of New York

DEPARTMENT OF MATHEMATICS and COMPUTER SCIENCE

CSI 33

Midterm Exam Review

Midterm Exam covers:
Chapter 1: all sections
Chapter 2: Sections 2.1 - 2.3, 2.6
Chapter 3: all sections
Chapter 8: which is mainly an overview of C++
Chapter 9: which is mainly an overview of C++ classes (exclude files work)
Chapter 10: all sections

You will see the following types of questions on the Midterm Exam:
1. True/False and Multiple Choice questions

2. Short Answer questions

3. Programming questions

Topics to review:

1. Finding asymptotic running time in theta-notation of a given program.

2. *Linear Search*, *Binary Search*, *Selection Sort*, along with their run time complexity. You need to remember how each of the algorithms works!

3. The notions of *encapsulation*, *polymorphism* and *inheritance*.

4. `Python list`, `Card`, `Deck`, `Hand` **ADT**s. You need to remember their implementations, and should know the run-time complexities of their methods.

5. `Python dictionary`, along with efficiency analysis.

6. `unit tests` an how to write them.

7. All suggested exercises from the textbook (True/False, Multiple Choice, Short Answer questions)

8. C++ *pointers*, *dynamic memory allocation*, and *deallocation*, *memory leaks* and *accessing invalid memory*.

9. C++ *dynamic arrays*, *class copy constructor* and *destructor*.

Sample questions:

1. Python lists are implemented using contiguous arrays. True or False?

2. Inserting into the middle of array-based implementation of list is a $\Theta(n)$ operation. True or False?

3. Looking up an item in a Python dictionary, given a key, is a $\Theta(n)$ operation. True or False?

4. Which of the following is **not true** of Python list (choose only one)?

    (a) They are implemented underneath as contiguous arrays
    (b) They allow for efficient random access
    (c) They can grow and shrink dynamically
    (d) All items in a list must be of the same type

5. What operation is not supported for Python dictionaries?

    (a) Item ordering (sorting)
    (b) Item insertion
    (c) Item deletion
    (d) Item lookup

6. A C++ function must return a value. True of False?

7. Give box-and-arrow diagrams that illustrate the state of the C++ memory model immediately after each of these statements, including the last. What problem occurs in this program? How is it called? How can it be fixed?

```
int *b, *c;
b = new int;
*b = 3;
c = new int;
*c = 5;
*b += *c;
c = b;
delete c;
delete b;
```

references: Sections 10.1 and 10.2 in the book