

# CS200 Quiz 1: Pre-Requisites (8/28/14)

Name:

1. If passwords are strings of starting with an uppercase letter and ending in a number (single digit) and characters in between may be either letters or numbers, how many passwords of length 4 are there?

Circle the correct answer. [12 pts]

a.  $4^{62}$

b.  $62^4$

c.  $62! * 36!$

d. *None of the above –  $26 * 62^2 * 10$  – 26 possible uppercase letters for the first position, then 62 ( $26 + 26 + 10$ ) for the second and third positions, then 10 for the last position. They are multiplied together because they represent fixed length sequence of independent values. Factorials are used when looking at subsets or permutations over sets (e.g., select 3 socks from 5 socks of different colors). See pgs. 386-391 in Rosen.*

2. When writing a method called `add(String s)` to add a data element of type `String` to the front of a singly linked list, what cases should be handled in the code? [18 pts]

- *List length > 1*
- *empty list*
- *need to create head [optional]*

3. What is required when using binary search to check for an element of a particular value in an array? [12 pts]

- The array is of length > 1.
- The array has an even number of elements in it.
- The array contains elements of type `String`.
- The elements are in sorted order.*

4. Given this code from the same class:

```
public static void main(String[] args) {
    int [] A = new int[10];
    int B = Integer.parseInt(args[0]);
    for (int i=0; i<10; i++) { A[i] = i * B;}
    int C = Integer.parseInt(args[1]);
    check(A,C);
    System.out.println(A[C]);}
private static void check(int[] D, int C) {
    for (int i=0; i<10; i++) {D[i]--;}
    C = 0;}
```

- What will it print out given arguments 2 and 5? [14 pts] *9 – in Java, primitive types are pass by value (meaning a copy of them is provided to the calling method) and compound data structures (as in arrays) are pass by reference (meaning the address is memory of the data structure is provided to the calling method). So the line “C=0” has no effect on the value of C in the main method.*
- Describe an error that the code should check for. [18 pts] *Possibilities: First argument not being an integer, second argument not being an integer from 0-9. Args being available. Out of bounds on D[] in check.*

5. Let  $P(n)$  be the statement that  $1^2 + 2^2 + \dots + n^2 = n(n+1)(2n+1)/6$  for the positive integer  $n$ .

a. What is the statement  $P(1)$ ? [14 pts]  $1^2 = (1 * 2 * 3)/6$

b. Show that  $P(1)$  is true, completing the basis step of the proof. [12 pts] *Show that both sides in part a equal 1.*