### Quiz #3

#### General Questions, Multiple Choice

Timed: 22 minutes Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Final Mark: \_\_\_\_\_\_ / 22

| **Question**  **#** | **Best**  **Answer** | **Guessed?**  **(yes or no)** |
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Blue Mark Criteria AP (Red Mark) Criteria  
  
Correct: \_\_\_\_ / 11 Correct: \_\_\_\_ / 11  
  
Wrong: \_\_\_\_ / 11 Wrong: \_\_\_\_ / 11  
  
No Attempts: \_\_\_\_ / 11 No Attempts: \_\_\_\_ / 11  
  
Blue Mark = Correct - 0.25(Wrong) Red Mark = Correct - 0.25(Wrong)  
  
 = \_\_\_\_\_\_\_ - 0.25(\_\_\_\_\_) = \_\_\_\_\_\_\_ - 0.25(\_\_\_\_\_)   
  
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### Questions:

(Choose the best answer. 0.25 marks are deducted for mistakes)

1. You are solving a problem involving the placement of several markers on  
 an 8 x 8 chessboard. Which of the following types would be most appropriate  
 for a variable that keeps track of all the squares that are occupied by  
 markers?  
  
 (A) apmatrix<bool> B(8,8);  
  
 (B) struct Node {  
 bool occupied;  
 Node\* next;  
 };  
 Node\* Top;  
  
 (C) apvector<int> B(8,8);  
  
 (D) apvector<bool> B(8,8);  
  
 (E) struct Node {  
 int row;  
 int col;  
 };  
 apvector<Node> B; {the size of B to be equal to the number of markers}  
  
2. A student complains that the C++ language on his local computer must have  
 a flaw. As proof, the student demonstrates that the body of a function  
 assigns the value 7 to a parameter V, but immediately upon return from  
 the function, the parameter bound to V (also called V) has the value 2  
 rather than 7 as the student intended. Its value immediately before the  
 call to the function was also 2. Of the following, which is most probably  
 the cause of the difficulty?   
  
 (A) V was not properly initialized before being used.  
 (B) V was a reference parameter and should have been a value parameter.  
 (C) V was a value parameter and should have been a reference parameter.  
 (D) The formal parameter V was not of the same type as the actual   
 parameter V.  
 (E) Different names were needed for the formal and the actual parameters.  
  
  
3. Consider the following program:  
  
 int main() {  
 char ch;  
 int i;  
  
 do {  
 cin >> ch;  
 } while (ch == 'X');  
  
 while (ch != 'Z') {  
 cin >> ch;  
 }  
 }  
  
 For which of the following inputs does the program above fully read   
 without error?  
  
 (A) A X B Z (B) A Z B X (C) Z Z Z X (D) Z B X A (E) Z X X X  
  
  
  
4. Given a file of 1000 integers, what is the minimum number of integers  
 that must be kept in RAM at one time to determine the largest integer  
 in the file? (Assume that no number will be read more than once.)  
  
 (A) 1001 (B) 1000 (C) 500 (D) 10 (E) 2  
  
  
  
5. Questions 5 and 6 are based on the following program segment, which  
 searches an array. This array is sorted in increasing order and contains  
 Num elements, where Num is nonnegative. First, Last, Middle are integers.  
 found is bool. The first element if List[1] and the last element is List[100].  
  
 First = 1;  
 Last = Num;  
 found = false;  
   
 while (First <= Last) and (! found) {  
 Middle = (First + Last) / 2;  
 if (Item == List[Middle])  
 found = true;  
 else  
 if (Item < List[Middle])  
 Last := Middle - 1;  
 else  
 First:= Middle + 1;  
 }  
  
 How many times will the body of the loop be executed if Num = 100 and  
 Item = List[1]?  
   
 (A) One (B) Three (C) Four (D) Five (E) Six  
  
  
  
6. See program above in #5. Which of the following assertions will be true  
 every time the program segment completes execution?  
   
 (A) (Item == List[Middle]) or (! found)  
 (B) (Item == List[Middle]) and (found)  
 (C) (First <= Middle <= Last)  
 (D) (First < Last)  
 (E) None of the above  
  
  
7. Consider the following sequence of function calls.  
  
 Push(s,x);  
 Push(s,y);  
 Add(s);  
 Push(s,z);  
 Push(s,w);  
 Mult(s);  
 Add(s);  
  
 Invoking Push causes its second argument to be pushed onto its first  
 argument, a stack. Invoking the functions Add or Mult causes (1) the  
 stack to be popped twice, (2) the two popped items to be added or   
 multiplied, and (3) the result to be pushed onto the stack. If x=10,  
 y=20, and z=30, and w=40, and the stack is empty initially, then at the  
 end of the sequence of function calls above, the stack contains  
  
 (A) nothing (B) 0 (C) 940 (D) 1230 (E) 1410  
  
  
8. Assume that linked lists are implemented using the following definitions.  
 struct ListType {  
 int info;  
 ListType\* next;  
 };  
  
 Consider the following code segment, which is intended to remove the last  
 node from a singly linked list. The variable First points to the first   
 node in the list, if there is one, and has the value NULL otherwise. Assume  
 that each node which is removed, is deleted such that the space is succes-  
 sfully returned to the system.  
  
 ListType\* p, q, First;  
   
 p = First;  
 q = p->next;  
 while (q->next != NULL) {  
 p = q;  
 q = q->next;  
 }  
 p->next = NULL;  
  
 Which of the following describes the class of all linked lists for which  
 this algorithm works correctly?  
   
 (A) No linked lists  
 (B) All nonempty linked lists  
 (C) All linked lists with more than one entry  
 (D) The empty list and all linked lists with more than one entry  
 (E) All linked lists  
  
9. If there are 8 nonleaf nodes in a binary tree, at most how many leaves can  
 there be?  
  
 (A) 1 (B) 4 (C) 9 (D) 16 (E) 32  
  
  
  
10. A certain binary tree T is represented as a two-dimensional 5 x 3 array A,  
 with rows of A corresponding to nodes of T. The columns of A contain the  
 following information:  
  
 Column 1 --- the row index of the left child  
 Column 2 --- the value stored at the node  
 Column 3 --- the row index of the right child  
  
 A row index of 0 indicates a nonexistent child. If A consists of the entries  
  
 5 g 4  
 1 m 0  
 0 r 0  
 3 s 0  
 0 v 0  
  
 then T is given by which of the following diagrams?  
  
 (A) g (B) g (C) m  
 / \ / \ /  
 s v v s g  
 \ / / \  
 r r v s  
 /  
 r  
  
  
  
 (D) m (E) g  
 \ / \  
 g m r  
 / \ /  
 s v s  
 \ /  
 r v  
  
  
11. Each record in a mailing list contains a name, address, social insurance  
 number, and possibly some pointer or integer fields for linking records.  
 The list is very seldom changed. There are two operations to be performed   
 frequently: printing mailing labels ordered by postal code, and finding a  
 particular record given its social insurance number. Assume that efficiency  
 in both space and time are important.  
  
 Of the following, which is the best way to store the mailing list records  
 in order to carry out the operations most efficiently?  
  
 (A) Use two arrays, one ordered by social insurance number and one  
 ordered by postal code.  
 (B) Use one array, ordered by social insurance number, with records  
 linked in postal code order  
 (C) Use two linked lists, one ordered by social insurance number and  
 one ordered by postal code.  
 (D) Use one array, ordered only by social insurance number  
 (E) Use one array, ordered by postal code and by social insurance  
 number within each postal code.