**Computer Science I – Exam #1 Multiple Choice Version A**

**Date: 6/12/12**

**All questions are worth 4 points.**

1) Consider a binary search in the array shown below (using the code from class), search for the number 27. Which indexes of the array get searched, before arriving at index 8?

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 3 | 6 | 7 | 10 | 12 | 13 | 20 | 25 | 27 | 30 |

a) 4, 6 b) 4, 7 c) 5, 7 d) 5, 9 e) None of the Above

2) What is the problem with the function below that attempts to solve the sorted list matching problem in O(n) time? You may assume that the length of both list1 and list2 is n.

void sortedListMatch(int list1[], int list2[], int n) { // line 1

 int l1\_index = 0; // line 3

 int l2\_index = 0;

 while (l1\_index < n || l2\_index < n) { // line 5

 if (list1[l1\_index] < list2[l2\_index]) // line 7

 l1\_index++;

 else if (list1[l1\_index] > list2[l2\_index]) // line 9

 l2\_index++;

 else { // line 11

 printf("%d ", list1[l1\_index]);

 l1\_index++;

 l2\_index++;

 }

 }

 printf("\n"); // line 17

}

a) Nothing, it works in all cases. b) Infinite Loop c) An array out of bounds will occur on line 5.

d) An array out of bounds will occur on line 7. e) None of the Above

3) The recursive function lucas is defined below. What is the return value of lucas(8) ?

int lucas(int n) {

 if (n == 1)

 return 1;

 if (n == 2)

 return 3;

 return lucas(n-1) + lucas(n-2);

}

a) 18 b) 29 c) 45 d) 66 e) None of the Above

4) In class you learned a special technique called fast modular exponentiation. Given that 96 mod 67 equals 64, trace through the fast modular exponentiation algorithm by hand to calculate 925 mod 67. (Hint, you can treat 64 mod 67 the same as -3.)

a) 9 b) 14 c) 22 d) 59 e) None of the Above

5) The minimum number of moves to solve the Towers of Hanoi puzzle for 6 disks is 63. Using this information, determine the minimum number of moves to solve the puzzle for 7 disks.

a) 64 b) 127 c) 128 d) 255 e) None of the Above

6) Using the **recursive permutation algorithm** shown in class, list the permutations of "CAT" in the order that the algorithm will produce them if the original input string is "CAT".

a) ACT b) CAT c) CAT d) CAT e) None of the Above

 ATC CTA CTA CTA

 CAT ACT ACT TCA

 CTA ATC ATC TAC

 TAC TAC TCA ATC

 TCA TCA TAC ACT

7) In minesweeper, we must be careful to avoid array out of bounds errors when checking for adjacent bombs to a square. A different technique to deal with this issue than taught in class is to declare an array that is bigger than necessary, so that any check you would have made, instead of being out of bounds, searches a valid "dummy" square. If we wanted to play minesweeper on an n x n grid and we were using this technique to avoid array out of bounds errors, how big would our array have to be?

a) n x n b) (n + 1) x (n + 1) c) (n + 2) x (n + 2) d) (2n) x (2n) e) None of the Above

8) What is the result of converting 63457 to base 10?

a) 2237 b) 2338 c) 3456 d) 5436 e) None of the Above

9) What is the result of converting 3712 in base 10 to base 16 (hexadecimal)?

a) 8E b) E80 c) 1480 d) 2317 e) None of the Above

10) What is the result of converting AD7516 to binary?

 a) 1001110001110101 b) 1010110101110110 c) 1010110110000101

d) 1010110101110101 e) None of the Above

11) An O(n2) algorithm takes 2 seconds to run on an input size of n = 10,000. On another input size, the algorithm takes 50 seconds to complete. What is that input size, most likely?

a) 20,000 b) 30,000 c) 100,000 d) 250,000 e) None of the Above

12) An O(nlgn) algorithm takes 40 milliseconds to run on an input size of n = 220. How long will the algorithm take to run on an input size of n = 225? (Use base 2 logarithms in your computations.)

a) .1 seconds b) .5 seconds c) 1.6 seconds d) 16 seconds e) None of the Above

13) What is the value of $\sum\_{i=n}^{2n}i$, in terms of n?

a) $\frac{n(n+1)}{2}$ b) $\frac{2n(2n+1)}{2}$ c) $\frac{n(3n+1)}{2}$ d) $\frac{n(3n+3)}{2}$ e) None of the Above

14) What is the value of the variable sum after the code segment below finishes execution?

int sum = 0, n = 100, i, j;

for (i=1; i<n; i++) {

 for (j=0; j<=i; j++)

 sum = sum + 3;

 sum = sum + 20;

}

a) 17127 b) 17150 c)17450 d) 113850 e) None of the Above

15) What general flavor do "Sour Patch Kids" have?

a) sour b) sweet c) salty d) bitter e) None of the Above