

University Interscholastic League

# **Computer Science Competition 2004-05**

**SAC PRACTICE TEST 2**

- Remember that calculators are NOT permitted.

**QUESTION 1**

What is the value of  $1001010_2 + 110011_2$ ?

- A.  $1111101_2$     B.  $1111111_2$     C.  $1111021_2$     D.  $0_2$     E. None of these

**QUESTION 2**

Which of the following replaces **<\*1>** in the code to the right to declare a constructor for the class that will build a `Test` object with all of its data members initialized to 0?

- A. `public Test():0,0,0,0 {};`  
 B. `public Test(x=0,y=0,c=0,d=0);`  
 C. `public Test();`  
 D. `public Test() {}`  
 E. None of these

```
public class Test {
    <*1>
    public double add() { return c + d; }
    public int multiply() { return x * y; }
    public void setX(int x) { this.x = x; }
    public void setY(int y) { this.y = y; }
    public void setC(double c)
        { this.c = c; }
    public void setD(double d)
        { this.d = d; }

    private int x, y;
    private double c, d;
}
```

For the remaining questions, assume that **<\*1>** has been filled in correctly.

**QUESTION 3**

Which of the following creates a `Test` object and sets its `x` and `y` data members to 2?

- A. `Test t = new Test();`  
`t.setX(2);`  
`t.setY(2);`  
 B. `Test t();`  
`t.setX(2);`  
`t.setY(2);`  
 C. `Test t;`  
`t.setX(2);`  
`t.setY(2);`  
 D. `Test t;`  
`t.setX().setY(2);`  
 E. More than one of these

**QUESTION 4**

What can access private data member `c`?

- A. Any class  
 B. Any code in the class `Test` or in the same package  
 C. Any `main()` method  
 D. Any class that imports `Test`  
 E. None of these

**QUESTION 5**

If a list contains 32 elements, what is the minimum number of comparisons that will be done when searching for an item in the list using the sequential search algorithm?

- A. 0                      B. 1                      C. 5                      D. 32                      E. None of these

**QUESTION 6**

What is output by the method call `output("CATHY")`?

- A. nothing                      B. cathy  
C. CATHY                      D. C  
E. None of these

```
public static void output(String s) {
    for (int i=0; i<s.length(); ++i)
        System.out.print(
            Character.toUpperCase(
                s.charAt(i)));
}
```

**QUESTION 7**

What is output by the method call `output("Jane 3")`?

- A. nothing                      B. Jane 3  
C. JANE 3                      D. J  
E. None of these

**QUESTION 8**

What is the value of `count` after the completion of the outer loop in the code to the right if `getInt()` returns the value 9?

- A. 9                      B. 45  
C. 81                      D. 100  
E. None of these

```
int count=0;
int n = getInt();

for (int i=0; i<n; ++i)
    for (int j=i; j<n; ++j)
        ++count;
```

**QUESTION 9**

What is the running time of the double loop to the right? Choose the smallest correct answer.

- A.  $O(1)$                       B.  $O(n)$   
C.  $O(n^2)$                       D.  $O(n^{3.5})$   
E. None of these

**QUESTION 10**

Which of the following is possible as the return value of `s1.compareTo(s2)` if `s1` and `s2` are lower case words with `s1` coming before `s2` in the dictionary?

- A. -5                      B. 0                      C. 1                      D. 4                      E. None of these

**QUESTION 11**

What does `int[][] intArray` look like after executing the code to the right?

A. 

0	0	0
0	0	0
0	0	0

B. 

0	0	0
1	2	3
2	4	6

C. 

0	1	2
0	1	2
0	1	2

D. 

0	1	2
1	2	3
2	3	4

E. None of these

```
int[][] intArray = new int[3][3];
for (int i=0; i<3; ++i)
    for (int j=0; j<3; ++j)
        intArray[j][i] = j*i+j;
```

**QUESTION 12**

What does `int[] a` look like after the static method call `turn(a, 2, 5)` if `a` starts as the array below?

1	2	3	4	5	6
---	---	---	---	---	---

A. 

1	2	3	4	5	6
---	---	---	---	---	---

B. 

1	2	6	5	4	3
---	---	---	---	---	---

C. 

1	2	6	4	5	3
---	---	---	---	---	---

D. 

6	5	4	3	2	1
---	---	---	---	---	---

E. None of these

```
public static void turn(int[] a, int begin,
                       int end) {
    int temp, diff=end-begin;

    for (int i=0; i<=diff/2; ++i) {
        temp=a[begin+i];
        a[begin+i]=a[end-i];
        a[end-i]=temp;
    }
}
```

**QUESTION 13**

What is returned by the static method call `recurse(10, 25)`?

A. 35 B. 40 C. 45 D. 50 E. None of these

```
public static int recurse(int i, int j) {
    if (i==0) return j;
    else return recurse(i-1, j+2);
}
```

**QUESTION 14**

What interface name replaces <\*1> in the code to the right so that the BST methods can use the compareTo() method on data?

- A. Object
- B. Serializable
- C. Cloneable
- D. Comparable
- E. None of these

For the remaining questions, assume that <\*1> has been filled in correctly.

**QUESTION 15**

When a BST object is constructed, what value will left and right be initialized to?

- A. 0
- B. null
- C. this
- D. undefined
- E. None of these

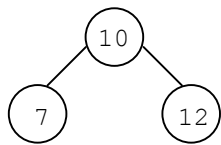
**QUESTION 16**

What does BST b look like after executing the code below?

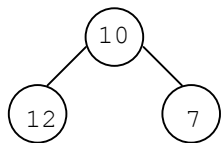
```
BST b = new BST (new Integer(10));
b.add(new Integer(7))
.add(new Integer(12));
```

A. Syntax error in code

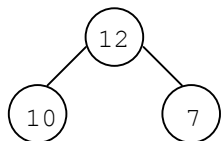
B.



C.



D.



E. More than one of these

```
public class BST {

    public BST(<*1> value) {
        data=value;
    }

    public BST add(<*1> value) {
        int c = data.compareTo(value);

        if (c<0) {
            if (right!=null)
                right.add(value);
            else right = new BST(value);
        }

        else if (c>0) {
            if (left!=null)
                left.add(value);
            else left = new BST(value);
        }

        return this;
    }

    // other methods not shown

    private BST left, right;
    private <*1> data;
}
```

**QUESTION 17**

Which of the following replaces `<*1>` in the code to the right so that the default constructor builds a circle with radius 1?

- A. `this(1);`
- B. `Circle(1);`
- C. `super(1);`
- D. `r=1;`
- E. More than one of these

**QUESTION 18**

Assume that `<*1>` has been filled in correctly. Which of the following returns the area of `PlaneCircle pc`?

- A. `(Circle)pc.area()`
- B. `pc.super.area()`
- C. `pc.(Circle)area()`
- D. `pc.area()`
- E. None of these

**QUESTION 19**

Given a `Circle c` that is initialized to hold a `Circle` and a `PlaneCircle pc` that is initialized to hold a `PlaneCircle`, which of the following expressions evaluates to true?

- A. `Circle instanceof PlaneCircle`
- B. `c instanceof pc`
- C. `c instanceof Circle`
- D. `Circle instanceof Object`
- E. None of these

**QUESTION 20**

Which of the following returns true?

- A. `mystery("banana")`
- B. `mystery("abcdeedcba")`
- C. `mystery("ASDFDSA")`
- D. `mystery("ananabanana")`
- E. More than one of these

```
public class Circle {
    public Circle() {
        <*1>
    }
    public Circle(int r) {
        radius = (r>0)?r:1;
    }
    public double area() {
        return Math.PI * radius * radius;
    }
    private int radius;
}
public class PlaneCircle extends Circle {
    public PlaneCircle(int r, int x, int y) {
        super(r);
        this.x = x;
        this.y = y;
    }
    private int x;
    private int y;
}
```

# Computer Science Answer Key

## UIL Practice 2 2005

1. A
2. D - By default all class data members are initialized to 0, null, or false as appropriate.
3. A - Creating an object requires a call to new.
4. E - Only code in class Test can access c.
5. B - The item could be the first one in the list.
6. C - Character.toUpperCase() doesn't change characters that aren't lowercase.
7. C
8. B -  $9 + 8 + \dots + 1$
9. C - Sum of 1 to n is  $n(n+1)/2 = O(n^2)$
10. A - `s1.compareTo(s2)` returns a negative number if s1 is smaller, which for lowercase letters is dictionary order.
11. B - The first index of `intArray` gives the row, and the second index the column.
12. B - The static method `turn()` reverses the part of the array starting at the begin index and ending 1 before the end index.
13. C - This computes  $j + 2*i$ .
14. D
15. B
16. B - As with many questions about data structures the correct answer can be found from knowing how the data structure works without having to trace through the code.
17. A
18. D - You can use methods defined in a superclass without having to do anything special.
19. E - Although these are all false or syntax errors, the following would all be true: `c instanceof Circle`, `pc instanceof PlaneCircle`, `pc instanceof Circle`, `c instanceof Object`, `pc instanceof Object`
20. B - The static method `mystery()` checks that the string is a palindrome and that it increases from the left to the middle.