

University Interscholastic League

# **Computer Science Competition 2003-04**

JAVA PRACTICE QUESTIONS – SET 3

- Remember that calculators are NOT permitted for this year's contests.

**QUESTION 1**

What is returned by the function to the right when it is passed this matrix?

1	3	2	3
2	3	1	3
1	3	2	3

- A. 

0
0
0
- B. 

0	0	0
0	0	0
- C. 

0	0	0
---	---	---
- D. 

0	0
0	0
0	0
- E. None of these

```
public static int[][] process(int[][] M) {
    int r = M[1][2],
        c = M[2][1];

    int[][] N = new int[r][c];

    return N;
}
```

**QUESTION 2**

What is output by the code to the right?

- A. 1567.8                      B. 1.5678  
 C. .0015678                  D. 1.56783  
 E. None of these

```
String s = "1.5678e3";
System.out.print(Double.parseDouble(s));
```

**QUESTION 3**

What is returned by `extract("12345")`?

- A. 54321                      B. 12345  
 C. "edcba"                    D. "abcde"  
 E. None of these

```
public static long extract(String s) {
    long x = 0;
    for (int i=0; i<s.length(); ++i)
        if (s.charAt(i)>='0' &&
            s.charAt(i)<='9')
            x = 10*x + s.charAt(i) - '0';
    return x;
}
```

**QUESTION 4**

What is returned by `extract("12ij23sn7")`?

- A. 73221                      B. 700320021  
 C. 12237                      D. 120023007  
 E. None of these

**QUESTION 5**

Which of these describes the access of the `addChild()` method?

- A. It can be called anywhere
- B. It can only be called inside the `Panel` class
- C. It can be called inside the `Panel` class and in classes in the same package
- D. It cannot be called
- E. None of these

**QUESTION 6**

If `p1` and `p2` are `Panel`s, which of these sets `p2` to be the northwest panel of `p1`?

- A. `p1.addChild(p2, Panel.NW);`
- B. `p2.addChild(p1, Panel.NW);`
- C. `addChild(p1,p2, Panel.NW);`
- D. `addChild(p2,p1, Panel.NW);`
- E. None of these

**QUESTION 7**

If `Panel p` has these panels added as children, what will be the value of `p.h` and `p.w` after running the method `p.computeSize()`?

NE: no child

NW: panel with height 10 and width 45

SE: panel with height 15 and width 30

SW: panel with height 20 and width 10

- A. `p.h = 20, p.w = 45`
- B. `p.h = 35, p.w = 40`
- C. `p.h = 30, p.w = 45`
- D. `p.h = 45, p.w = 85`
- E. None of these

```
// Represents a panel for part of a
// windowing system. Each panel can hold
// four smaller panels. Data members
// representing the contents of the panels
// are omitted.
```

```
public class Panel {
    public Panel(int height, int width) {
        h = height;
        w = width;
        child = new Panel[4];
    }

    public void resize(int newh, int neww) {
        h = newh;
        w = neww;
    }

    public void addChild(Panel kid, int d) {
        child[d]=kid;
    }

    public void computeSize() {
        int w1=((child[NE]!=null)?
                child[NE].w:0)+
            ((child[NW]!=null)?
                child[NW].w:0);
        int w2=((child[SE]!=null)?
                child[SE].w:0)+
            ((child[SW]!=null)?
                child[SW].w:0);
        int h1=((child[NE]!=null)?
                child[NE].h:0)+
            ((child[SE]!=null)?
                child[SE].h:0);
        int h2=((child[NW]!=null)?
                child[NW].h:0)+
            ((child[SW]!=null)?
                child[SW].h:0);
        h=(h1>h2)?h1:h2;
        w=(w1>w2)?w1:w2;
    }

    private int h,w;
    private Panel[] child;

    public static final int NE=0;
    public static final int NW=1;
    public static final int SE=2;
    public static final int SW=3;
}
```

**QUESTION 8**

Which of the following replaces `<*1>` in the code to the right so that `find()` correctly implements a binary search?

- A. `if (r<=s)`
- B. `if (r==s)`
- C. `if (r<s)`
- D. `if (r>s)`
- E. None of these

```
public static boolean find(Comparable[] A,
                           int r, int s,
                           Comparable item){
    <*1>
    return false;
    int mid = (r+s)/2;
    if (A[mid].equals(item)) return true;
    else if (A[mid].compareTo(item)<0)
        return find(A,mid+1,s,item);
    else
        return find(A,r,mid-1,item);
}
```

**QUESTION 9**

What replaces `<*1>` in the code to the right to set the data member `increment` to the value of the constructor parameter `increment`?

- A. `increment = increment;`
- B. `increment = this.increment;`
- C. `this.increment = increment;`
- D. Syntax error to use the same name
- E. None of these

```
public class Counter {
    public Counter(int start, int increment){
        total=start;
        <*1>
    }

    public int currentTotal() {
        return total;
    }

    public int runningTotal() {
        return running;
    }

    public void update() {
        total+=increment;
        running+=increment;
    }

    private int total;
    private final int increment;
    private static int running = 0;
}
```

**QUESTION 10**

Assume that `<*1>` is filled in correctly. What is output by the code below?

```
Counter c1 = new Counter(5,1);
Counter c2 = new Counter(0,3);
c1.update();
c1.update();
c2.update();
System.out.print(c1.runningTotal());
```

- A. 3
- B. 5
- C. 7
- D. 10
- E. None of these

**QUESTION 11**

Which of these functions from the `java.lang.Math` class is used to compute the base  $e$  logarithm of a number?

- A. `loge()`
- B. `ln()`
- C. `flog()`
- D. `logarithm()`
- E. None of these

**QUESTION 12**

Which of the following replaces `<*1>` in the code to the right so that the `pop()` method functions correctly?

- A. `return data.remove();`
- B. `return data.remove(last);`
- C. `return data.remove(data.size());`
- D. `return data.removeLast();`
- E. None of these

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

**QUESTION 13**

In order to use the `LinkedList` class without a package name, what package must be imported at the top of the `Stack.java` file?

- A. `java.awt`                      B. `java.lang`
- C. `java.io`                        D. `java.util`
- E. None of these

**QUESTION 14**

Which of the following will store in `String s` the string given by popping `Stack stk`?

- A. `s = stk.pop();`
- B. `s = (String)stk.pop();`
- C. `s = ((String)stk).pop();`
- D. `s = stk.pop(String)`
- E. More than one of these

**QUESTION 15**

What are the values of `a`, `b`, and `c` after the outer while loop executes?

- A. `a=0, b=0, c=0`
- B. `a=10, b=50, c=50`
- C. `a=10, b=59, c=59`
- D. `a=11, b=50, c=50`
- E. None of these

```
public class Stack {
    public Stack() {
        data = new LinkedList();
    }

    public void push(Object item) {
        data.addLast(item);
    }

    public Object pop() {
        <*1>
    }

    public boolean isEmpty() {
        return data.isEmpty();
    }

    private LinkedList data;
}
```

```
int a=0, b=0, c=0;

while (a<10) {
    b=a; c=b+100;
    do {
        ++b; --c;
    } while (b!=c);
    ++a;
}
```

**QUESTION 16**

Which of the following replaces `<*1>` in the code to the right so that the loop adds all of the values in the array to sum?

- A. `sum += intArray[i++];`
- B. `sum += intArray[++i];`
- C. `sum += intArray[i++];`
- D. `sum += intArray[++i];`
- E. None of these

```
int sum=0;
int intArray[25];

// code which fills the array

for (int i=0; i<25; ++i)
    <*1>
```

**QUESTION 17**

If `StringBuffer sb` holds the string "lhappyg1r7", what is returned by `process (sb)`?

- A. 5
- B. 6
- C. 7
- D. 8
- E. None of these

```
public static int process(StringBuffer s) {
    int sum=0;
    for (int i=0; i<s.length(); ++i) {
        char c = s.charAt(i);
        if (c>='0' && c<='9')
            sum = sum + (c-'0');
        else
            s.setCharAt(i, (char) (c+1));
    }
    return sum;
}
```

**QUESTION 18**

If `StringBuffer sb` holds the string "lhappyg1r7", what does `sb` hold after the function call `process (sb)`?

- A. lhappyg1r7
- B. happygr
- C. 2ibqqzh2s8
- D. ibqqzhs
- E. None of these

**QUESTION 19**

Which of the following is a possible output of the code to the right?

- A. 0.4501123749009396
- B. 45.012432123122452
- C. 123901341.12314122
- D. -12.132301443122101
- E. All of these

```
java.util.Random r =new java.util.Random();
System.out.println(r.nextDouble());
```

**QUESTION 20**

In the class `java.util.Arrays` is a static method `sort()` which implements Quicksort on an array. What is the expected running time of `java.util.Arrays.sort()` on an array of  $n$  random integers? Choose the smallest correct answer.

- A.  $O(\log n)$
- B.  $O(n)$
- C.  $O(n \log n)$
- D.  $O(n^2)$
- E. None of these

# COMPUTER SCIENCE ANSWER KEY

## JAVA PRACTICE QUESTIONS SET 3

- |     |   |     |   |
|-----|---|-----|---|
| 1.  | C | 11. | E |
| 2.  | A | 12. | D |
| 3.  | B | 13. | D |
| 4.  | C | 14. | B |
| 5.  | A | 15. | C |
| 6.  | A | 16. | C |
| 7.  | C | 17. | E |
| 8.  | D | 18. | E |
| 9.  | C | 19. | A |
| 10. | B | 20. | C |