University Interscholastic League
Computer Science Competition

Number 146 (District 2 - 2014)

General Directions:

1) **DO NOT OPEN EXAM UNTIL TOLD TO DO SO.**

2) **NO CALCULATOR OF ANY KIND MAY BE USED.**

3) There are 40 questions on this contest exam. You have 45 minutes to complete this contest. If you are in the process of actually writing an answer when the signal to stop is given, you may finish writing that answer.

4) Papers may not be turned in until 45 minutes have elapsed. If you finish the test before the end of the allotted time, remain at your seat and retain your paper until told to do otherwise. Use this time to check your answers.

5) All answers must be written on the answer sheet/Scantron card provided. Indicate your answers in the appropriate blanks provided on the answer sheet or on the Scantron card. Clean erasures are necessary for accurate Scantron grading.

6) You may place as many notations as you desire anywhere on the test paper, but not on the answer sheet or Scantron card, which are reserved for answers only.

7) You may use additional scratch paper provided by the contest director.

8) All questions have ONE and only ONE correct (BEST) answer. There is a penalty for all incorrect answers.

9) A reference to commonly used Java classes is provided at the end of the test, and you may use this reference sheet during the contest. You may detach the reference sheets from the test booklet, but DO NOT DO SO UNTIL THE CONTEST BEGINS.

Scoring:

1) All questions will receive 6 points if answered correctly; no points will be given or subtracted if unanswered; 2 points will be deducted for an incorrect answer.

QUESTION 1

Which of these is NOT equivalent to $100010_2 + 100000_2$?

A. 66_{10} B. 112_8 C. 42_{16} D. 1000010_2 E. All are equivalent

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QUESTION 2

What is output by the code to the right?

A. 5 19.0 3.8   B. 5 19.0 3

C. 5.0 19.0 3.8   D. 5 19 4

E. There is no output due to a compile error.

```
int w = 5;
double z = 19;
double q = z/w;
out.println(w+" "+z+" "+q);
```

QUESTION 3

What is output by the code to the right?

A. falsefalsefalse   B. truefalsefalse

C. truefalsetrue   D. truetruetrue

E. truetruefalse

```
Integer x = 5;
Integer y = x;
out.print(x==y);
y = 5;
out.print(x==y);
y = new Integer(5);
out.println(x==y);
```

QUESTION 4

What is output by the code to the right?

A. 5   B. 6 7 8

C. 5 6 7 8   D. 5 6 7

E. There is no output.

```
int x = 5;
while (x<=7)
   out.print(x+++" ");
```

QUESTION 5

What is output by the code to the right?

A. 1   B. 2   C. 5

D. 8   E. 9

```
String s = "bassGuitar";
out.println(s.lastIndexOf("a"));
```

QUESTION 6

What is output by the code to the right?

A. 5   B. 6   C. 9

D. 10   E. 11

```
int list[] = {1,3,5,2,4};
out.println(list[1]+list[3]);
```

QUESTION 7

For which initial values of p and q will this expression output false?

A. true true   B. true false

C. false true   D. false false

```
boolean p = <value1>,q = <value2>;
out.println(p||q);
```

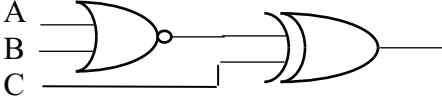---

QUESTION 8

What is output by the code to the right?

A. 00   B. 0

C. 06   D. 66

E. 60

```
int z = 42;
if(z%7==0)
   out.print(z/7);
   out.println(z%7);
```

QUESTION 9

What is output by the code to the right?

A. 63 254   B. 254 63   C. 63 -2

D. 508 31   E. 31 508

```
int b = 127;
int c = 127;
out.println((b>>=2)+" "+(c<<=2));
```

QUESTION 10

What is output by the code to the right?

A. -5.0   B. -6.0

C. 5.0   D. 6.0

E. There is no output due to a compile error.

```
double f = -5.9423;
out.println(Math.floor(f));
```

QUESTION 11

Which statements would correctly replace <statement1> in the client code on the right to correctly modify the current Guitar object g into a 5 string bass guitar?

    I.   g.getNumStrings(5);
    II.   g.setNumStrings(5);
    III.   g = new Guitar(5) ;
    IV.   g = new Guitar(5,"bass") ;

A. I only

B. II only

C. III only

D. III and IV only

E. II, III, and IV only

```
static class Guitar
{
  private String type;
  private int numStrings;
  public Guitar(){
     type = "acoustic";
     numStrings = 6;
  }
  public Guitar(int n){
     this();
     numStrings = n;
  }
  public Guitar(int n, String s){
     this(n);
     type = s;
  }
  public void setType(String s){
     type = s;
  }
  public String getType(){
     return type;
  }
  public void setNumStrings(int n){
     numStrings = n;
  }
  public int getNumStrings(){
     return numStrings;
  }
  public String toString()
  {
     return type+": "+numStrings+
     " string";
  }
///////////////////////////////
////client code
Guitar g = new Guitar(4,"bass");
<statement1>
<statement2>
out.println(g);
```

QUESTION 12

Which statement would correctly replace <statement2>
in the client code shown to output the type for the Guitar object g?

A. out.println(g.getType());

B. out.println(g.setType("bass"));

C. out.println(g.getNumStrings());

D. out.println(g.setNumStrings(4));

E. out.println(g);

QUESTION 13

Assuming the statements above have been correctly defined as described what is the output of the client code?

A. 4 string bass

B. 5 string bass

C. bass: 4 string

D. bass: 5 string

E. 6 string acoustic

QUESTION 14

What is output by the code to the right?

A. 5   B. 5.6

C. 7   D. 7.3

E. 9

```
out.printf("%.1f\n",3*4.2-7);
```

QUESTION 15

What is output by the code to the right?

A. `abcdef`   B. `defabc`

C. `cbafed`   D. `fedcba`

E. There is no output due to a compile error

```
static void showGrid(char[][]g){
 for(int r=g.length-1;r>=0;r--){
  for(int c=g[0].length-1;c>=0;c--)
   out.print(g[r][c]);
 }
}
//client code
char[][]g={{'a','b','c'},
          {'d','e','f'}};
showGrid(g);
```

QUESTION 16

For which of these input values will the output be 9?

A. 240   B. 100   C. 600

D. 250   E. 260

```
 double d = <input>;
 int x=0;
 do {
    d/=2;
    x++;
 }while(d>=1.0);
 out.println(x);
```

QUESTION 17

What value is in position 4 after the client code to the right executes?

A. 6   B. -1   C. 2

D. 5   E. 4

```
public static void Myst(int[]list){
   for(int j = 3;j<=5;j++)
     list[j]=list[j-2]-list[j-1];
}
//client code
int [] list = new int[6];
list[1]=5;
list[2]=2;
Myst(list);
```

QUESTION 18

What is the greatest value in the list after the method call?

A. 0   B. -1   C. 2

D. 5   E. 4

QUESTION 19

Which of these choices could replace **`<statement1>`** to output the value 5?

    I.   substring(15)
    II.   substring(16)
    III.   substring(5,10)
    IV.   substring(7,12)
    V.   substring(10,16)

A. I only   B. I, II, and III only

C. I, III, and IV only   D. II, III, and IV only

E. All will work correctly to output the value 5

```
String a = "01234567890123456789";
out.println(a.<statement1>.length());
```

QUESTION 20

What is output by the code to the right?

A. 000 010 101 110   B. 000 010 101 111

C. 001 011 101 110   D. 001 010 100 111

```
for(int p = 0; p <= 1; p++)
  for(int q = 0;q <= 1; q++)
    out.print(""+p+q+(p^q&p)+" ");
```

QUESTION 21

What is output by the code to the right?

A. 2.0   B. 3.0   C. 4.0

D. 5.0   E. 6.0

```
double y = 42;
y %= 13;
y = ++y;
out.println(y);
```

QUESTION 22

What is output by the code to the right?

A. 1010   B. 1100   C. 10

D. 00001010   E. 1110

```
String s=Integer.toBinaryString(10);
out.println(s);
```

What is output by the code to the right?

A. 64   B. 8   C. 4

D. 32   E. 16

```
out.println(Short.SIZE);
```

What is output by the code to the right?

A. -1.00   B. 0.00   C. 1.00

D. 2.72   E. 3.14

```
double d = Math.log(Math.E);
out.printf("%.2f",d);
```

Find f(6,5) according to the recursive function definition shown on the right.   You may use the space below to do your work.

$$f(6,5) =$$

$$f(x,y) = \begin{cases} 2+f(x-3,y-1) & \text{when } x>y \text{ and } x>0 \\ 1+f(y,x) & \text{when } y>=x \text{ and } x>0 \\ 0 & \text{when } x<=0 \end{cases}$$

A. 8   B. 6   C. 5

D. 2   E. 3

What is output by the code to the right?

A. 32   B. 31

C. 1   D. 2

E. There is no output due to a compile error.

```
int x = -1>>>32;
String s = Integer.toBinaryString(x);
out.println(s.length());
```

What is output by the code to the right?

A. 3a   B. 4a   C. 4ade

D. 3vea   E. 4IL

```
String s = "ILoveAParade";
String []a = s.split("[j-rM-Q]");
List<String> b = Arrays.asList(a);
out.println(b.size()+b.get(3));
```

What is output by the code to the right?

A. 34 114   B. 34 44

C. 44 54   D. 35 45

E. 34 54

```
Integer i = 34;
String s = i.toString();
int x = i;
String t = Integer.toString (x,5);
out.println(s+" "+t);
```

What is output by the code to the right?

A. winterwind winterwind

B. winterwind wimterwimd

C. suntersund sumtersumd

D. winterwind suntersund

E. winterwimd sumtersumd

```
String w = "winterwind";
w.replaceAll("win","sun");
String s = w.replace('n','m');
out.println(w+" "+s);
```

QUESTION 30

Which of the following logical statements is represented by the digital electronics diagram on the right ?

A. A ^ B || C   B. !(A || B) ^ C

C. !(A ^ B) || C   D. A || B ^ C

QUESTION 31

There is possibly something wrong with the code on the right that would cause a compile error, or it could be just fine. Which answer choice best describes the situation ?

A. There is nothing wrong…the code is fine as is.

B. The abstract class methods should not have semicolons

C. The word `extends` should be `implements` instead

D. `{}` brackets are missing in the abstract class methods

E. The word `public` needs to precede each method definition.

```
abstract class A{
  abstract void A1();
  abstract int A2();
}

class B extends A{
  void A1(){}
  int A2(){return 0;}
}
//client code
A b = new B();
b.A1();
out.print(b.A2());
```

QUESTION 32

Assuming the code is updated so that method A1 outputs the phrase "`I made a `" and method A2 returns the value `240`, what is the output of the client code listed?

A. `0`   B. `240`

C. `I made a 240`

D. There is no output due to a compile error.

E. There is no output due to a runtime error.

QUESTION 33

What is output by the code to the right?

A. `3`   B. `7`   C. `9`

D. `5`   E. `6`

```
Queue<Integer> q = new
      LinkedList<Integer>();
q.add(3);q.add(5);q.add(9);
q.poll();q.add(6);q.poll();
q.poll();q.add(2);q.add(7);
out.println(q.peek());
```

QUESTION 34

Which of these is the least efficient O(N) rating?

A. $O(N)$ B. $O(N^2)$ C. $O(\log N)$ D. $O(N \log N)$ E. $O(1)$

QUESTION 35

What is output by the code to the right?

A. `16`   B. `15`   C. `14`

D. `13`   E. `12`

```
String ss="Now is the time for all"+
  " good men to come to the aid of"+
  " their country";
String [] a = ss.split(" ");
Set<String> s = new
  HashSet<String>(Arrays.asList(a));
out.println(s.size());
```

QUESTION 36

If A and B are Boolean values, which is the most simplified expression for A*B*A+0, where * means AND, + means OR, 0 means false, and 1 means true?

A. `0`   B. `1`   C. `A`   D. `A*A*B`   E. `A*B`

What bottom-left-corner to top-right-corner diagonal series of characters is produced by this code??

A.   abcde   B.   DEFGH
C.   ABCDE   D.   defgh
E.   01234

```
for(int x=0;x<5;x++){
 for(int y=0;y<5;y++)
   out.print(((x+y)%5==4)
        ?(char)(y+100):'-');
 out.println();
}
```

What is output by the code to the right?

A. 45657   B. 4565   C. 5657

D. 7565   E. 5654

```
LinkedList<Integer>a = new
LinkedList<Integer>();
a.push(4); a.add(5);
a.offer(6);a.add(3,5);
a.offerLast(7);a.pollFirst();
Iterator<Integer> i =
    a.descendingIterator();
while(i.hasNext())
        out.print(i.next());
```
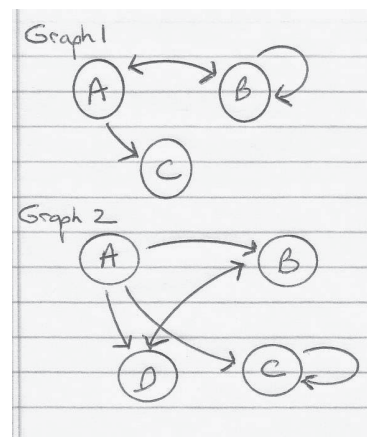
In graph 1 on the right, the adjacency matrix would look like this, where 1 means a one way connection and 0 would mean no connection:

	A	B	C
A	0	1	1
B	1	1	0
C	0	0	0

How many zeroes would be in the adjacency matrix for Graph 2?

A. 6   B. 10   C.   16

D. 13   E. 3

What is output by the code to the right?

A. 10 10   B.   10 20

C. 10 25   D.   25 10

E. 20 20

```
static void p(int []a,int []b){
  a[0]=a[0]+b[0];
  b[0]=a[0]-b[0];
  a=b;
}
//client code
int [] x={10};
int [] y={5};
p(x,y);
p(y,x);
out.println(x[0]+" "+y[0]);
```