Computer Science

Invitational

January 14, 2017

General Directions:

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

2) **NO CALCULATORS of any kind may be used.**

3) 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 forty-five 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. You may 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 except on the answer sheet or Scantron card which is 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. **All provided code segments are intended to be syntactically correct, unless otherwise stated (i.e. `error` is an answer choice). Ignore any typographical errors and assume any undefined variables are defined as used.**

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

10) Assume that any necessary import statements for Standard Java 2 Packages and classes (e.g. .lang, .util, System, Math, Double, etc.) are included in any programs or code segments that refer to methods from these classes and/or packages.

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 each incorrect answer.

Note: Correct responses are based on Java, **J2sdk v 1.8.x**, from Sun Microsystems, Inc. All provided code segments are intended to be syntactically correct, unless otherwise stated (i. e. `error` is an answer choice) and any necessary Java 2 Standard Packages have been imported. Ignore any typographical errors and assume any undefined variables are defined as used. **For all output statements, assume that the System class has been statically imported...** ***import static java.lang.System.*;***

QUESTION 1

What is 59_{10} plus 29_{16} ?

A. 73_{16} B. 1110010_2 C. 99_{10} D. 88_{16} E. 1100100_2

QUESTION 2

What value could y be such that z becomes 0 in the code to the right?

A. 8 B. 6 C. 9 D. 7 E. 5

```
int x = 595, y = ?, k = 62;
int z = x % y + k % y - y;
```

QUESTION 3

What is output by the code to the right?

A. ALEXANDER
ALEXANDER

B. ALEXANDER
4ALEXANDER

C. ALEXANDER
ALEXANDER

D. ALEXANDER
1ALEXANDER

E. There is no output due to a syntax error

```
String list = "ALEXANDER";
int k = list.length()/3+1;
String x = "%"+k+"s\n%";
out.printf(x+k+"d"+list,list,k);
```

QUESTION 4

What is output by the code to the right?

A. DIARLEROC
B. IARLE
C. DIAARLCROC
D. DIABRLEYROC
E. IABRLEY

```
String s = "CROC";
String x = "HARLEY";
String y = "DIABLO";
s = y.substring(0,3)+
    x.substring(2,x.length()-1)+
    s.substring(1);
out.println(s);
```

QUESTION 5

What values for a, b, and c make the output to the right `true`?

A. a = true, b = true, c = false
B. a = false, b = false, c = false
C. a = true, b = true, c = true
D. a = false, b = true, c = true
E. the output is always false

```
boolean a, b, c, d;
d = !a && (b && a || !c);
out.println(d);
```

QUESTION 12

What is output by the code to the right?

A. 6
B. 3
C. 7
D. 4
E. There is not output due to a run-time error

```
int sum = 0;
String ans = "EARTHANGEL";
for(int i=0; i<ans.length(); i++)
      if(ans.charAt(i)>'K')
            sum++;
out.println(sum);
```

QUESTION 13

Which of the following does not have the same precedent as the others in java?

A. <=
B. >=
C. >>
D. >
E. <

QUESTION 14

What is output by the code to the right?

A. 383
B. 0
C. -384
D. 127
E. -128

```
out.println(Byte.MIN_VALUE*3);
```

QUESTION 15

What is output by the code to the right?

A. [5, 3, 4, 4, 2, 6, 5, 1, 9, 0, 5]
B. [5, 3, 4, 4, 2, 6, 1, 9, 0, 5]
C. [0, 5, 3, 4, 4, 2, 6, 1, 9, 5]
D. [5, 4, 3, 4, 2, 6, 1, 9, 0, 5]
E. There is no output due to a run-time error

```
ArrayList<Integer> list =
                        new ArrayList<>();
int[] x = {5,3,4,2,6,1,9,0};
for(int t:x)
      list.add(t);
list.add(0);
list.add(10,5);
list.remove(6);
list.add(2,4);
out.println(list);
```

QUESTION 21

What is held by `list` after the line at <*1> is run by the code to the right?

A. `[30, 9, 50, 28, 34, 11]`

B. `[30, 9, 34, 14, 3, 8]`

C. `[30, 9, 42, 17, 15, 11]`

D. `[30, 9, 42, 17, 10, 11]`

E. there is a run time error

QUESTION 22

What is held by `list` after the line at <*2> is run by the code to the right?

A. `[33, -24, 39, -6, 2, 6]`

B. `[30, 9, 42, 17, 15, 11]`

C. `[27, 17, 72, 69, 17, 40]`

D. `[30, 9, 42, 17, -83, 11]`

E. there is a run time error

```
public void mys1(int[]x,int a,int b)
{
  int start = Math.min(a,b);
  int stop = Math.max(a,b);
  for(int i = start; i<=stop; i++)
    if(i<=0)
      x[i+1]-=x[i]/2;
    else if(i>=x.length-1)
      x[i-1]-=x[i]/2;
    else
    {
      x[i+1]-=x[i]/2;
      x[i-1]-=x[i]/2;
    }
}
// CLIENT CODE
int[] list = {30,9,42,17,15,11};
mys1(list, 5,3); //<*1>
mys1(list, 30, 11); //<*2>
```

QUESTION 27

What is output by the code on the right?

A. [1, 4, 13, 38, 37, 18, 11, 45]

B. [4, 13, 38, 37, 18, 11, 45, 1]

C. [1, 4, 11, 13, 18, 37, 38, 45]

D. [1, 4, 11, 38, 37, 18, 13, 45]

E. [1, 4, 11, 37, 45, 18, 13, 38]

```
PriorityQueue<Integer> pq;
pq = new PriorityQueue<Integer>();
int[] list = {1,4,13,38,37,18,11,45};
for(int x:list)
    pq.add(x);
pq.add(pq.remove());
out.println(pq);
```

QUESTION 28

What is returned by the method call `mys2(8,2)`?

A. 9

B. 31

C. 61

D. 45

E. There is no output due to a stack overflow exception

```
public static int mys2(int x, int y)
{
  if (x == y)
     return x;
  x++;
  y+=3;
  out.println(x+" "+y);
  return x|y + mys2(x, y);
}
```

QUESTION 29

Which of the following method calls do not result in a stack overflow error?

A. `mys2(4,9)`

B. `mys2(9,4)`

C. `mys2(21,14)`

D. `mys2(16,4)`

E. `mys2(64,61)`

QUESTION 30

What is output by the code to the right?

A. 0

B. 55

C. 17

D. 51

E. 38

```
out.println(38 ^ 21 & 17 | 35 >> 1);
```

QUESTION 33

What is output by the code at <*1>?

A. [LONELIEST, ONE, IS, THE]

B. [ONE, IS, THE, LONELIEST]

C. [IS, LONELIEST, ONE, THE]

D. [ONE, LONELIEST, IS, THE]

E. [THE, LONELIEST, ONE, IS]

QUESTION 34

What is output by the code at <*2>?

A. [S, N, B, N, H, O]

B. [I, L, N, O, T, T]

C. [I, O, M, O, T, W]

D. [S, N, B, O, T, W]

E. there is no output due to an out of bounds exception

```
TreeSet<String> set;
set = new TreeSet<String>();
set.add("ONE");
set.add("IS");
set.add("THE");
set.add("LONELIEST");
out.println(set);//<*1>
TreeMap<String,Character> map =
     new TreeMap<String,Character>();
set.add("NUMBER");
set.add("TWO");
set.add("IS");
int i=0;
for(String k:set)
{
  i++;
  map.put(k, k.charAt(i));
}
out.println(map.values());//<*2>
```

QUESTION 35

How many empty strings are in `list` after the code on the right has executed?

A. 10

B. 5

C. 11

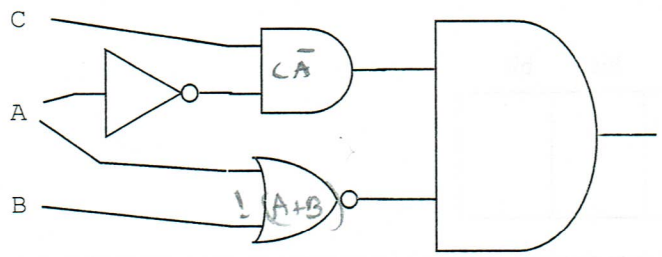
D. 0

E. 6

```
String x = "LAUNDRYDAYSEEYOUTHERE";
String[] list = x.split("[ADYE]+");
```

QUESTION 36

Which of the following best represents the circuit given below.



A. !A || !B && !C && !A

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

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

D. !A || C || !A && B

E. !(A || C) || !(A && B)

QUESTION 37

Simplify the following Boolean algebra expression:

!(A+B)A!B+A!(!(CA)+!(BCB))+!(BC)

A. A!B+!C B. A+!CB C. !A!B+C D. ABC+!B+!C E. A