UIL COMPUTER SCIENCE WRITTEN TEST – 2017 DISTRICT

Note: Correct responses are based on **Java SE Development Kit 8 (JDK 8)** from Sun Microsystems, Inc. All provided code segments are intended to be syntactically correct, unless otherwise stated (e.g., "error" is an answer choice) and any necessary Java SE 8 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 using:**

```
import static java.lang.System.*;
```

Question 1.

Which of the following is the sum of $A4_{16}$ and $3E_{16}$?

A) 228_{10} **B)** 341_{8} **C)** $E2_{16}$ **D)** 11100011_{2} **E)** None of the above.

Question 2.

What is the output of the code segment to the right?

A) 3.0 **B)** 3 **C)** 4 **D)** 4.0 **E)** 1

```
out.println(12/4.0*5/5);
```

Question 3.

What is the output of the code segment to the right?

A)
```
Computer
Science
```
B)
```
\"Computer\"
\"Science\"
```
C)
```
"Computer"
"Science"
```
D) `Computer Science`

E) `"Computer" n "Science"`

```
out.print("\"Computer\"\n\"Science\"");
```

Question 4.

What is the output of the code segment to the right?

A) `sketball` **B)** `asketball` **C)** `all`

D) `ll` **E)** `basketball`

```
String s="basketball";
out.print(s.substring(s.indexOf("a")));
```

Question 5.

What is the output of the code segment to the right?

A) `true` **B)** `false`

```
boolean b=false,c=true,d=false,e;
e=b^!(c||d);
out.print(e);
```

Question 6.

What is the output of the code segment to the right?

A) `9.0` **B)** `8.0` **C)** `9` **D)** `6.0` **E)** `8`

```
out.print(Math.pow(3,2));
```

Question 7.

What is the output of the code segment to the right?

A) `e` **B)** `E32` **C)** `133` **D)** `101`

E) Error. Will not compile because of a type mismatch.

```
char c='E';
int d=32;
out.print(c+d);
```

Question 8.

What is the output of the code segment to the right?

A) `Warning`

B) `Warning 38.5`

C) `Warning Danger 38.5`

D) `Danger 28.0`

E) `Warning 28.0`

```
double p=38.5;
if(p<32)
      out.print("OK");
else if(p<45)
      out.print("Warning");
else
      out.print("Danger");
      p-=10.5;
out.print(" "+p);
```

Question 9.

Which of the following represents the output of this code segment?

A) `0 2 4 6 8`

B) `2 4 6 8 10`

C) `2 4 6 8`

D) `0 4 8 12`

E) `0 2 4 6 8 10`

```
int a=0;
do{
      out.print(a+" ");
      a+=2;
}while(a<10);
out.print(a);
```

Question 10.

What is the output of the code segment to the right?

A) `[0, 3, 2, 2, 4]`

B) `[0, 0, 2, 6, 2]`

C) `[0, 0, 2, 6, 6]`

D) `[0, 0, 2, 5, 5]`

E) Error. Throws an ArrayIndexOutOfBoundsException

```
int a[]={1,3,2,5,4};
a[a[0]]=0;
a[0]=a[a[0]];
a[4]=a[a[3]];
out.print(Arrays.toString(a));
```

Question 11.

Which of the following can replace **<code>** in this class so that the class will compile and run correctly?

```
import static java.lang.System.out;
import java.io.*;
import java.util.*;
public class Abc {

      public static void main(String[] args) <code>{
            Scanner s=new Scanner(new File("datafile.dat"));
            while(s.hasNext())
                  out.println(s.next());
      }
}
```

A) throws IOException

B) throws FileException

C) IOException

D) throws ScannerException

E) No additional code is required.

Question 12.

What is the output of the code segment to the right?

A) `dcoagt`

B) `dogcat`

C) `cdaotg`

D) `gt`

E) No output. Throws StringIndexOutOfBoundsException.

```
String s1="dog",s2="cat",s3="";
int i=0;
while(i<s1.length()){
      s3=s3+s1.charAt(i)+s2.charAt(i);
      i++;
}
out.print(s3);
```

Question 13.

What is the value of the expression shown to the right?

A) true

B) false

C) 225

D) 15

E) 9

```
14|11&9
```

Question 14.

What is the output of the code segment to the right?

A) 32767

B) 32768

C) 2147483647

D) 2147483648

E) 9223372036854775807

```
out.print(Integer.MAX_VALUE);
```

Question 15.

What is the output of the code segment to the right?

A) 3.14

B) 2.72

C) 1.62

D) 6.28

E) 0.0

```
ArrayList<Double> a=new ArrayList<Double>();
a.add(3.14);
a.add(2.72);
a.set(0, 1.62);
a.set(0, 6.28);
out.print(a.get(1));
```

Question 16.

To ensure that the values stored in parameters `f` and `l` are correctly assigned to the fields `first` and `last`, which of the following lines of code can replace **<code1>** in the class listed to the right?

A) `super(f,l);`

B) `this.Student(f,l);`

C) `Student.super(f,l);`

D) `Student.this(f,l);`

E) `this(f,l);`

Question 17.

Which of the following should replace **<code2>** to ensure that the method `calculate()` will compile and run correctly?

A) `float`

B) `int`

C) `void`

D) `double`

E) No additional code is required.

Question 18.

Assume that **<code1>** and **<code2>** have been replaced correctly in the class Student shown to the right. What is the output of the client code shown here?

```
Student s1=new
Student("Bob","Smith","1234");
s1.add(90);
s1.add(65);
s1.add(93);
out.println(s1);
```

A) `Bob Smith 1234 82.0`

B) `Bob Smith 1234 83.0`

C) `Bob Smith 1234 83`

D) `Bob Smith 1234 82`

E) `Bob Smith 1234 82.66666666666667`

Question 19.

Assume that **<code1>** and **<code2>** have been replaced correctly in the class Student shown to the right. What is the output of the client code shown here?

```
Student s2=new Student("Jane","Jones");
s2.add(95);
out.println(s2);
```

A) `Jane Jones`

B) `Jane Jones 95.0`

C) `Jane Jones null 95.0`

D) Error. Throws a NullPointerException.

E) Error. Will not compile.

```
public class Student {
private String first;
private String last;
private String id;
private ArrayList<Integer> grades = new
ArrayList<Integer>();

public Student(){}

public Student(String f,String l){
      first=f;
      last=l;
}

public Student(String f,String l,String i){
      <code1>
      id=i;
}

public void add(int g){
      grades.add(g);
}

public <code2> calculate(){
      double total=0.0;
      for(int g:grades)
            total+=g;
return Math.round(total/grades.size());
}

public String toString(){
return first+" "+last+" "+id+"
"+calculate();
}
}
```

Question 20.

What is the output of the code segment to the right?

A) `Telx hsem`

B) `Telewax h`

C) `TNOeekxwl`

D) `Tx sem`

E) There is no output due to an error.

```
char[][] c=new char[3][];
c[0]="Texas".toCharArray();
c[1]="New Mexico".toCharArray();
c[2]="Oklahoma".toCharArray();
for(int x=0;x<c[0].length;x+=2){
      out.print(c[0][x]);
      out.print(c[1][x+1]);
      out.print(c[2][x+2]);
}
```

Question 21.

What is the output of **line #1** in the code segment to the right?

A) `[lizard, frog, snake, frog] [dog, cat, snake]`

B) `[lizard, frog, snake] [dog, cat, snake]`

C) `[frog, lizard, snake] [cat, dog, snake]`

D) `[frog, frog, lizard, snake] [cat, dog, snake]`

E) `[frog, lizard, snake] [cat, dog]`

Question 22.

What is the output of **line #2** in the code segment to the right?

A) `[frog, cat, snake, lizard, dog]`

B) `[snake]`

C) `[lizard, frog]`

D) `[frog, lizard]`

E) `[cat, dog, frog, lizard, snake]`

```
Set<String> s1=new TreeSet<String>();
Set<String> s2=new TreeSet<String>();
s1.add("lizard");
s1.add("frog");
s1.add("snake");
s2.add("dog");
s2.add("cat");
s1.add("frog");
s2.add("snake");
out.println(s1+" "+s2); //line #1
s1.retainAll(s2);
out.println(s1); //line #2
```

Question 23.

What is the output of the code segment to the right?

A) `2`

B) `64`

C) `8.00`

D) `8 8`

E) `1000`

```
out.println(Integer.toString(8, 2));
```

Question 24.

Which of the following Java expressions is equivalent to `a&&(b||c)`?

A) `(a||b)&&(a||c)` **B)** `a&&b||a&&c` **C)** `(a||b)||c` **D)** `a||b&&c` **E)** `!(a&&b)||!c`

Question 25.

Which of the following cannot be the output of the code segment to the right?

A) `21`

B) `20`

C) `29`

D) `30`

E) All of the above are possible output.

```
double r=Math.random();
int s=(int)(r*10+20);
out.print(s);
```

Question 26.

What is the output of the code segment shown on the right?

A) 14

B) 19

C) 6

D) 10

E) 15

```
int t=0;
for(int x=1;x<=5;x++){
      switch(x){
      case 1:t+=x;break;
      case 2:t+=x+1;
      case 3:t*=2;break;
      case 4:t+=3;
      default: t-=x;
      }
}
out.print(t);
```

Question 27.

The least restrictive run time efficiency (Big O value) of a sequential search is O(n). If a method that implements the sequential search algorithm can search a list of 30,000 items in 0.75 seconds, how long will it take for that same method to search a list of 90,000 items?

A) 2.25 seconds **B)** 6.75 seconds **C)** 1.5 seconds **D)** 0.48 seconds **E)** 3.0 seconds

Question 28.

What is the output of this client code given the implementation of method `abc` shown on the right?

```
out.println(abc(0));
```

A) 51

B) 96

C) 24

D) 53

E) 30

```
public static int abc(int x){
if(x>10)
      return x-3;
else
      {
      x*=3;
      return x+abc(x+2);
      }
}
```

Question 29.

If the four methods shown to the right are all contained within the same class, which pair will cause the class to have a compile error?

A) I and II

B) I and III

C) II and III

D) II and IV

E) III and IV

```
//Method I
public static double abc(int x, int y){
      return x+y;
}
//Method II
public static double abc(int x, double y){
      return x+y;
}
//Method III
public static int abc(String s){
      return s.length();
}
//Method IV
public static String abc(String s){
      return s.substring(0);
}
```

Question 30.

What should replace **<code>** in the method `sort` shown to the right so that `list` is sorted in ascending order?

A) `list[j]<x`

B) `x<list[j]`

C) `x<j`

D) `x>list[j]`

E) `list[j]<list[j+1]`

Question 31.

Assuming that **<code>** has been replaced correctly, which sorting algorithm does method sort implement?

A) bubble sort

B) insertion sort

C) selection sort

D) merge sort

E) quicksort

```
public static void sort(int[] list){
for(int i=1;i<list.length;i++){
      int x=list[i];
      int j=i-1;
      while(j>=0&&<code>){
            list[j+1]=list[j];
            j--;
      }
      list[j+1]=x;
      }
}
```

Question 32.

What is the least restrictive worst case running time (Big O value) for the method sort?

A) O(n log n)

B) O(log n)

C) $O(n^2)$

D) O(n)

E) O(1)

Question 33.

Which of the following methods will correctly determine if any value of x is prime?

A)

```
public static boolean isPrime(int x){
boolean p=false;
int i=2;
while(p&&i<=Math.sqrt(x)){
      if(x%i==0){
            p=false;
            break;
      }
      else
            i++;
}
return p;
}
```

B)

```
public static boolean isPrime(int x){
boolean p=true;
int i=2;
while(p&&i<Math.sqrt(x)){
      if(x%i==0){
            p=false;
            break;
      }
      else
            i++;
}
return p;
}
```

C)

```
public static boolean isPrime(int x){
boolean p=true;
int i=4;
while(p&&i<x){
      if(x%i==0){
            p=false;
            break;
      }
      else
            i++;
}
return p;
}
```

D)

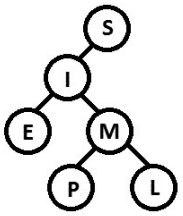
```
public static boolean isPrime(int x){
boolean p=true;
int i=2;
while(p&&i<=Math.sqrt(x)){
      if(x%i==0){
            p=false;
            break;
      }
      else
            i++;
}
return p;
}
```

E) All of the above will correctly determine if any value of x is prime.

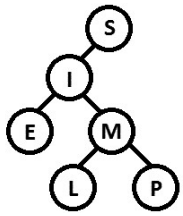
Question 34.

If the letters in the word SIMPLE are placed into a binary search tree starting with S and ending with E, which of the following is a correct representation of that tree?

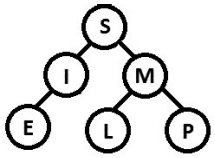
A)



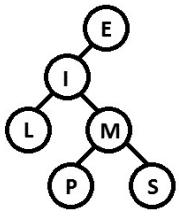
B)



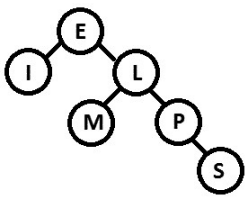
C)



D)



E)



Question 35.

The code segment shown to the right will not compile. Which of the lines marked are the cause of the compilation error?

A) I
B) II
C) III
D) I and II
E) I and III

```
int x=0,y=0;
for(;x<10;){ //line #I
      double z=5.0;
      y=y+(int)(x*z); //line #II
      x++;
}
out.print(x+y+z); //line #III
```

Question 36.

How many ordered pairs will make the Boolean expression shown to the right false?

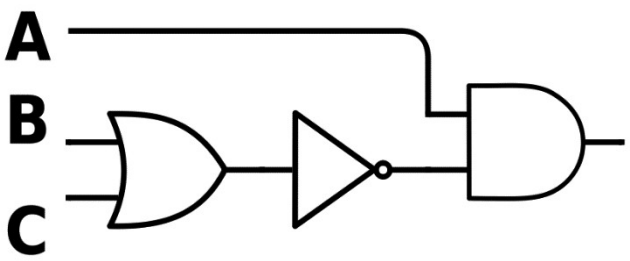
A) 0
B) 1
C) 2
D) 3
E) 4

$$\bar{A} + B$$

Question 37.

Which of the following Java expressions is equivalent to the Boolean expression depicted in the illustration on the right?

A) `A||!(B&&C)`
B) `A&&(!B||!C)`
C) `!(A&&B||C)`
D) `A&&!(B^C)`
E) `A&&!(B||C)`



Question 38.

Which of the following is the signed 8-bit two's complement representation of -54?

A) 00110110 **B)** 11001001 **C)** 11001000 **D)** 01001001 **E)** 11001010

Question 39.

After the code listed below executes, which element is at the head of the queue?

```
String[] list={"milk","eggs","bread","sugar","flour","chips","apples","coffee"};
PriorityQueue<String> q=new PriorityQueue<String>();
for(String s:list) q.add(s);
q.remove();
q.remove();
q.remove();
```

Question 40.

Rewrite this expression for calculating the area of a trapezoid using reverse polish notation (postfix).

½(b1+b2)h