UIL COMPUTER SCIENCE WRITTEN TEST – 2017 REGION

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 less than 100_8?

A) 40_{16} **B)** 32_{10} **C)** 01001000_2 **D)** 98_{16} **E)** 01000000_2

Question 2.

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

A) 6 **B)** 0 **C)** 0.0 **D)** 8 **E)** 6.0

```
out.println(8+5%4-3.0);
```

Question 3.

What is the output of the code segment to the right? *Dashes - indicate blank spaces.*

A) -----Total=$1234.57

B) Total=$-----1234.56

C) Total=$1234.57-----

D) Total=-----$1234.57

E) Total=$-----1234.57

```
out.printf("Total=$%12.2f",1234.5678);
```

Question 4.

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

A) ttgadget **B)** gogogadgeg **C)** tototadtet

D) togogadget **E)** Error. Throws a StringIndexOutOfBoundsException.

```
String s="gogogadget";
out.print(s.replace(s.substring(0, 1),
      s.substring(s.length()-1)));
```

Question 5.

Which of the following combinations will make this Boolean expression evaluate as true?

```
a||b&&c^d
```

A) a is false, b is false, c is true, d is false

B) a is true, b is false, c is false, d is false

C) a is false, b is true, c is true, d is true

D) All of the above.

E) None of the above.

Question 6.

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

A) 790.0 **B)** 790 **C)** 789 **D)** 789.0

E) Error. Will not compile.

```
double d=789.8653;
int i=Math.round(d);
out.print(i);
```

Question 7.

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

A) 37.39 5.56

B) 32.83 4.56

C) 32.00 5.56

D) 32.00 4.56

E) 32 5.56

```
double m=8.2;
double n=4.56;
m=(int)(--m*n++);
out.printf("%1.2f %1.2f",m,n);
```

Question 8.

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

A) Error. First case statement cannot be empty.

B) No output. Produces an infinite loop.

C) 5

D) 6

E) 1

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

Question 9.

Which of the following represents the output of the code segment shown on the right?

A) sehcodgocan

B) ecdoa

C) shogcn

D) sehcodgoca

E) shogc

```
String s="nacogdoches";
for(int i=s.length()-1;i>0;i-=2)
      out.print(s.charAt(i));
```

Question 10.

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

A) 5 4 3 2 1

B) 5 4 3 2 0

C) 0 2 3 4 5

D) 1 2 3 4 5

E) Error. Will not compile.

```
int a[]={1,2,3,4,5};
int[] b=new int[a.length];
for(int i=a.length-1;i>0;i--)
      b[i]=a[i];
for(int i:b)
      out.print(i+" ");
```

Question 11.

The class Abc contains an error. Which of the following best describes that error? The file *datafile.dat* is present in the correct directory and contains these values all listed on the same line.

2.5 1.75 3.25 4 5.85

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

     public static void main(String[] args) throws IOException{
          File f=new File("datafile.dat");
          Scanner s=new Scanner(f);
          double sum=0;
          while(s.hasNext())
               sum=sum+s.next();
          out.print(sum);
     }
}
```

A) Type mismatch: cannot convert from String to double

B) Type mismatch: cannot convert from int to double

C) Throws a ClassNotFoundException.

D) Scanner cannot be resolved to a type.

E) Unhandled exception: type FileNotFoundException.

Question 12.

The file datafile.dat is present in the correct directory and contains these values all listed on the same line.

2.5 1.75 3.25 4 5.85

Assume that this line of code is contained within the main method:

```
Scanner f=new Scanner(new File("datafile.dat);
```

Which of the following segments of code will read all of the values in Scanner object f, calculate the average of those values, and then print the average?

A.
```
double a=0;
int b=1;
do{
      a+=f.nextDouble();
      b++;
}while(f.hasNext());
out.print(a/b);
```

B.
```
double a=0;
int b=0;
double[] c=new double[100];
while(f.hasNext())
      c[b]=f.nextDouble();
for(double d:c)
      a+=d;
out.print(a/b);
```

C.
```
double a=0;
int b=0;
while(f.hasNext()){
   a+=f.nextDouble();
   b=b+a;
}
out.print(a/b);
```

D.
```
double a=0;
int b=0;
while(f.hasNext()){
      b++;
      a+=f.nextDouble();
}
out.print(a/b);
```

E. More than one of these will correctly calculate and print the average.

Question 13.

What is the output of the code segement shown to the right?

A) −1

B) 0

C) 4

D) 16

E) 32

```
int e=4,f=16;
out.print(f>>e-2);
```

Question 14.

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

A) −4 **B)** 3 **C)** −3 **D)** 0 **E)** 4

```
int d=3;
out.print(~d);
```

Question 15.

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

A) [grouse, dove, chukar, quail, turkey]

B) [dove, chukar, quail, pheasant, turkey, grouse]

C) [dove, quail, chukar, pheasant, turkey, grouse]

D) [dove, quail, chukar, turkey, grouse]

E) [dove, chukar, pheasant, turkey, grouse]

```
ArrayList<String> a=new ArrayList<String>();
String[] list=
      {"dove","quail","pheasant","turkey"};
for(String s:list)
      a.add(s);
a.add("grouse");
a.set(2, "chukar");
out.print(a);
```

```
// Use the following code to answer questions 16, 17, 18, 19 and 20.

public <code 1> class Vehicle {
      private String vin,make,model;
      private int year;
      private double odometer;
      public Vehicle(String vin, String make, String model, int i,double odometer) {
            System.out.print("Vehicle1 ");
            this.vin = vin;
            this.make = make;
            this.model = model;
            this.year = i;
            this.odometer=odometer;
      }
      public Vehicle(){System.out.print("Vehicle2 ");}
      public String getVin() {return vin;}
      public void setVin(String vin) {this.vin = vin;}
      public String getMake() {return make;}
      public void setMake(String make) {this.make = make;}
      public String getModel() {return model;}
      public void setModel(String model) {this.model = model;}
      public int getYear() {return year;}
      public void setYear(int year) {this.year = year;}
      public double getOdometer() {return odometer;}
      public void setOdometer(double miles){odometer=miles;}
      public abstract void drive(double miles);
}
public class Gas extends Vehicle {

      private double mpg,tank=0;

      public Gas(String vin, String make, String model, int i,double odometer,double mpg)
            {
            super(vin, make, model, i,odometer);
            this.mpg=mpg;
            System.out.print("Gas1 ");}
      public Gas() {System.out.print("Gas2 ");}
      public double getMpg() {return mpg;}
      public void setMpg(double mpg) {this.mpg = mpg;}
      public void addGas(double gallons){tank+=gallons;}
      public void drive(double miles){
            tank-=miles/mpg;
            <code 2>;}
}
public class Electric extends Vehicle {

      private double mpkWh,battery=0;
      private final double BATCAP=30;
      public Electric(String vin, String make, String model, int year, double odometer,
                        double mpkwh)
            {
            super(vin, make, model, year, odometer);
            this.mpkWh=mpkwh;}
      public Electric() {}

      public void drive(double miles) {
            battery-=miles/mpkWh;
            <code 2>;
      }
      public void charge(){battery=BATCAP;}
}
```

Question 16.

Which of the following should replace **<code 1>** to ensure that the Vehicle class will compile correctly?

A) `inherits` **B)** `extends` **C)** `final` **D)** `implements` **E)** `abstract`

Question 17.

Which of the following could replace **<code 2>** so that the `drive` method changes the `odometer` field to reflect the number of miles driven?

A) `odometer+=miles`

B) `setOdometer(getOdometer()+miles)`

C) `setOdometer(odometer+miles)`

D) `odometer=getOdometer()+miles`

E) `setOdometer(miles)`

Question 18.

Assuming that **<code 1>** and **<code 2>** have been filled in correctly, what is the output of the client code shown here?

```
Vehicle v1=new Gas("123456789","Toyota","Tundra",2012,42000,17.0);
out.println();
Electric v2=new Electric("987654321","Nissan","Leaf",2015,125.75,3);
out.println();
Vehicle v3=new Gas();
```

A)
```
Vehicle1 Gas1
Gas2
```
B)
```
Vehicle1 Gas1
Vehicle1
Vehicle2 Gas2
```
C)
```
Gas1 Vehicle1
Vehicle1 Vehicle2
Gas2
```
D)
```
Vehicle1 Gas1
Vehicle1
Gas2
```
E) Error. Will not compile.

Question 19.

Assume that **<code 1>** and **<code 2>** have been filled in correctly. One of the following lines of client code contains an error, which one is it?

A) `Gas v1=new Gas("123456789","Toyota","Tundra",2012,42000,17.0);`

B) `Vehicle v2=new Gas("123456789","Toyota","Tundra",2012,42000,17.0);`

C) `Electric v3=new Electric("987654321","Nissan","Leaf",2015,125.75,3);`

D) `Electric v4=new Vehicle("987654321","Nissan","Leaf",2015,125.75,3);`

E) `Vehicle v4=new Electric("987654321","Nissan","Leaf",2015,125.75,3);`

Question 20.

Assuming that **<code 1>** and **<code 2>** has been filled in correctly, what is the output of the client code shown here?

```
Vehicle v1=new Electric("7G54B100J321","Tesla","Model S",2016,100,4);
v1.charge();
v1.drive(100);
System.out.print(v1.getOdometer());
```

A) 30

B) 0

C) 100

D) 200

E) Error. Will not compile.

Question 21.

Which of the following values for `s` will make this line of code print true?

```
out.print(s.matches("[A-Z]{1}[a-z]+, [A-Z]{1}[a-z]+"));
```

A) John Smith

B) John,Smith

C) Smith, John

D) smith, john

E) All of the above will make the code print true.

// Use the code shown here to answer questions 22 and 23.

```
Map<Integer,String> m=new TreeMap<Integer,String>();
int[] locker={125,211,91,173,18};
String[] student={"Susan","Larry","Alex","Susan","Brianne"};
for(int i=0;i<locker.length;i++)
      m.put(locker[i], student[i]);
out.println(m); //line #1
m.put(91, "Lori");
out.print(m.get(91)+" "+m.remove(125)+" "+m.size()); //line #2
```

Question 22.

What is printed by **line #1** in the code shown above?

A) {18=Brianne, 91=Alex, 125=Susan, 173=Susan, 211=Larry}

B) {125=Susan, 211=Larry, 91=Alex, 173=Susan, 18=Brianne}

C) {Brianne, Alex, Susan, Susan, Larry}

D) {Brianne, Alex, Susan, Larry}

E) {91=Alex, 18=Brianne, 211=Larry, 125=Susan, 173=Susan}

Question 23.

What is printed by **line #2** in the code shown above?

A) Lori Susan 5.

B) Lori Susan 3

C) Alex Susan 3

D) Alex Susan 4

E) Lori Susan 4

Question 24.

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

A)
```
[2, -6, 0]
[2, 0, 1]
[8, 0, 4]
[-4,6,-1]
```
B)
```
[2, 2, 8, -4]
[-6, 0, 0, 6]
[4, 0, -1, 1]
```
C)
```
[2, -6, 0]
[2, 0, 1]
[8, 0, 4]
[-4,6,-1]
```
D)
```
[2, 2, 8, -4]
[-6, 0, 0, 6]
[0, 1, 4, -1]
```
E) There is no output due to an error.

```
int[][] a={{2,-1},{0,3},{1,0}};
int[][] b={{0,1,4,-1},{-2,0,0,2}};
int[][] p=new int[a.length][b[1].length];
for(int r=0;r<a.length;r++)
      for(int c=0;c<b[0].length;c++){
            int s=0;
            for(int x=0;x<b.length;x++){
                  s+=a[r][x]*b[x][c];}
            p[r][c]=s;}
for(int[]r:p)
      out.println(Arrays.toString(r));
```

Question 25.

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

A) 1 **B)** 2 **C)** 3 **D)** 4 **E)** 5

```
String s="fileeditproject";
String[] s2=s.split("e");
out.println(s2.length);
```

Question 26.

Every Java class is implicitly a subclass of _____.

A) Java **B)** Object **C)** all Java standard classes **D)** an Interface **E)** a package

Question 27.

If each of the data structures listed contains elements that implement the Comparable interface, which one can not be sorted by the Collections.sort(x) method?

A) ArrayList

B) LinkedList

C) Stack

D) All of the above can be sorted by Collections.sort(x).

E) None of the above can be sorted by Collections.sort(x).

```
// Use the code listed here to answer questions 28, 29 and 30.

public static void sort(int[] list){
      if(list.length<=1) return;
      int[] list1 = Arrays.copyOfRange(list, 0, list.length/2);
      int[] list2 = Arrays.copyOfRange(list, list.length/2, list.length);
      <code 1>
      arraycopy(tm, 0, list, 0, tm.length);
      }

public static int[] merge(int[] list1,int[] list2){
      int list1Index=0;
      int list2Index=0;
      int tempIndex=0;
      int[] temp = new int[list1.length+list2.length];
      // while loop referred to in question 29.
      while(list1Index<list1.length&&list2Index<list2.length){
            if(list1[list1Index]<list2[list2Index]){
                  temp[tempIndex]=list1[list1Index];
                  list1Index++;
                  tempIndex++;                  }
            else
                  {
                  temp[tempIndex]=list2[list2Index];
                  list2Index++;
                  tempIndex++;
                  }
      }
      // End of while loop referred to in question 29.
      while(list1Index<list1.length)
            {
            temp[tempIndex]=list1[list1Index];
            list1Index++;
            tempIndex++;
            }
      while(list2Index<list2.length)
                  {
            temp[tempIndex]=list2[list2Index];
            list2Index++;
            tempIndex++;
            }
      return temp;
      }
```

Question 28.

The code shown above is intended to implement the Merge Sort algorithm. What should replace **<code 1>** in the `sort` method so that it will compile and execute correctly?

A)
```
sort(list1);
int[] tm=merge(list1,list2);
sort(list2);
int[] tm=merge(list1,list2);
```

B)
```
int[] tm=merge(list1,list2);
sort(list1);
sort(list2);
```

C)
```
sort(list1);
sort(list2);
int[] tm=merge(list1,list2);
```

D)
```
int[] tm=merge(list1,list2);
```

E)
```
sort(list1);
sort(list2);
```

Question 29.

Which of the following best describes the function of the while loop marked by comments in the `merge` method?

A) Switch the elements in `list1` with the elements in `list2` and then place the resulting list into the array `temp`.

B) Place all of the elements in `list1` into the array `temp` and then place all of the elements from `list2` into the array `temp`.

C) Find the smallest element in both `list1` and `list2` and place each into the array `temp`.

D) As long as either `list1` or `list2` still contains elements, compare the current element in each and place the smaller of the two into the array `temp`.

E) As long as both `list1` and `list2` still contain elements, compare the current element in each and place the smaller of the two into the array `temp`.

Question 30.

What is the worst case relative time complexity (Big-O value) for a Merge Sort?

A) O(1)

B) O(n)

C) $O(n^2)$

D) O(log n)

E) O(n log n)

Question 31.

What is the output of method `abc` shown to the right if the value passed to x is 6?

A) `#$#$#*^&^&^`

B) `^&^&^*#$#$#`

C) `$#$#$*&^&^&`

D) `&^&^&*$#$#$`

E) `#^#^#$&$&$*`

```
public static void abc(int x){
      if(x==1)
            out.print("*");
      else if(x%2==0)
            {
            out.print("#");
            abc(x-1);
            out.print("^");
            }
      else
            {
            out.print("$");
            abc(x-1);
            out.print("&");
            }
}
```

Question 32.

Given the method `xyz` shown on the right what is the output of the client code shown here?

```
int m=20,n=2;
out.print(xyz(m,n)+" "+m+" "+n);
```

A) `90 20 2`

B) `84 20 2`

C) `84 34 6`

D) `84 29 5`

E) `90 34 6`

```
public static int xyz(int m,int n){
int c=m+n;
int d=m*n;
while(d>c){
      m+=n;
      n++;
      d-=n;}
return m+n+c+d;
}
```

Question 33.

What is the result of a preorder traversal of a binary search tree created by inserting the values 10, 5, 15, 20, 12, 6, and 1 in that order?

A) 1 5 6 10 12 15 20

B) 1 6 5 12 20 15 10

C) 10 5 1 6 15 12 20

D) 10 5 15 1 6 12 20

E) 20 15 12 10 6 5 1

Question 34.

What is the output of the code segment shown here?

```
String s1="Dallas",s2="Amarillo";
int x=s1.length()>s2.length()?s1.length():s2.length();
out.print(x);
```

A) 0 **B)** 14 **C)** 6 **D)** 8 **E)** There is no output due to an error.

Question 35.

What is the output of this line of code?

```
out.println(5<<3>>2&17);
```

A) 0 **B)** 40 **C)** 10 **D)** 1 **E)** 24

Question 36.

Which of the following truth tables shows all of the possible values for the expression $A * \bar{B} \oplus C$?

A)

A	B	C	
T	T	T	T
T	T	F	F
T	F	T	F
T	F	F	T
F	T	T	F
F	T	F	F
F	F	T	F
F	F	F	F

B)

A	B	C	
T	T	T	T
T	T	F	T
T	F	T	F
T	F	F	T
F	T	T	F
F	T	F	F
F	F	T	T
F	F	F	F

C)

A	B	C	
T	T	T	F
T	T	F	F
T	F	T	F
T	F	F	F
F	T	T	F
F	T	F	T
F	F	T	F
F	F	F	T

D)

A	B	C	
T	T	T	F
T	T	F	T
T	F	T	T
T	F	F	F
F	T	T	T
F	T	F	T
F	F	T	T
F	F	F	T

E)

A	B	C	
T	T	T	T
T	T	F	F
T	F	T	F
T	F	F	T
F	T	T	T
F	T	F	F
F	F	T	T
F	F	F	F

Question 37.

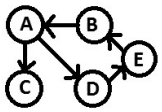
All of the following values are shown using signed 8-bit 2s complement binary representation. Which one would be closest to 0 (zero) on a number line?

A) 00010011 **B)** 10101101 **C)** 11111111 **D)** 00000101 **E)** 11011001

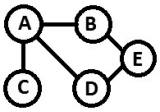
Question 38.

Which of the following graphs does the adjacency matrix to the right represent?

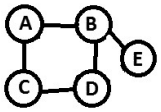
A)



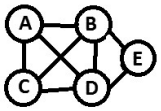
B)



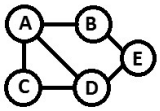
C)



D)



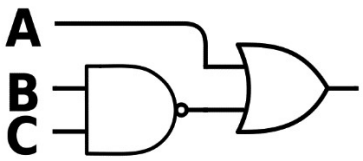
E)




```
int[][] am={
   {0,1,1,1,0},//A
   {1,0,0,0,1},//B
   {1,0,0,0,0},//C
   {1,0,0,0,1},//D
   {0,1,0,1,0}};//E
```

Question 39.

Write the Boolean expression that is represented by the digital electronics diagram shown on the right?



Question 40.

What is the relative time complexity (Big O value) for access within a doubly linked list that contains n elements?