UIL COMPUTER SCIENCE WRITTEN TEST

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 equivalent to $CF_{16} + 91_{16}$?

A) 160_{16} **B)** 352_{16} **C)** 353_{16} **D)** 252_{16} **E)** 210_{16}

Question 2

What is output by the code segment to the right?

A) 2
B) 4
C) -2
D) -4
E) 0

```
out.println((2 - 3) * 2 % 3);
```

Question 3

What is output by the code segment to the right?

A) `00212.42`
B) `212.42069`
C) `21200.42`
D) `21242069`
E) `00000212`

```
out.printf("%08.2f",212.42069);
```

Question 4

What is output by the code segment to the right?

A) `123 abc 123 baby you and MEEE`
B) `123 ABC 123 BABY YOU AND MEEE`
C) `i2e abc i2e baby you and MEEE`
D) `123 abc 123 baby you and meee`
E) No output due to an error.

```
String s = "123 abc 123 baby you and MEEE";
out.println(s.toLowerCase());
```

Question 5

What is output by the code segment to the right?

A) `NaN`
B) `2`
C) `2null`
D) `null`
E) No output due to an error.

```
int[] a = new int[5];
a[3] = 2; a[4] = 2; a[1] = 2;
out.println(a[4] + a[2]);
```

Question 6

What is output by the code segment to the right?

A) `-1`
B) `0`
C) `1`
D) `4`
E) `-0.25`

```
int alamo = 3;
int texas = 11;
texas /= alamo + 1;
out.println(texas - alamo);
```

Question 7

What pair of values for p and q will print `true`?

A) `p=true, q=false`
B) `p=true, q=true`
C) `p=false, q=true`
D) `p=false, q=false`
E) All of the above.

```
//assume p and q have been initialized
boolean p = <1>
boolean q = <2>
out.println((!p && !q) == !(p || q));
```

Question 8

What is output by the code segment to the right?

A) `1`
B) `2`
C) `3`
D) `12`
E) `13`

```
int abc = 123;
if (abc % 10 == 3)
    out.print(1);
if (abc % 100 == 1)
    out.print(2);
else
    out.print(3);
```

Question 9

What is output by the client code marked `//1`?

A) `2 4 3`
B) `4 4 4`
C) `3 4 3`
D) `3 4 2`
E) There is no output due to an error.

Question 10

What is output by the client code marked `//2`?

A) `2 3 2`
B) `1 3 2`
C) `2 3 1`
D) The output cannot be determined until runtime.
E) There is no output due to an error.

```
class Thing {
  int val;
  int thong;
  int thang;

  public Thing(int a) {
    val = a;
    if(a > 0) {
      thong = a-1;
      thang = a-2;
    }
  }

   public String toString() {
     return thong + " " + val + " " + thang;
   }
}

//1
out.println(new Thing(4));

//2
Object e = new Thing(3);
out.println(e.toString());
```

Question 11

What is output by the code segment to the right?

A) `63`
B) `64`
C) `127`
D) `0`
E) `-1`

```
int n = 63;
int m = 64;
out.println(m << 2 & n);
```

Question 12

What the Java order of precedence for the operators to the right?

A) `I, II, III, IV`
B) `I, III, II, IV`
C) `I, III, IV, II`
D) `III, IV, I, II`
E) `II, III, I, IV`

```
I)  (cast)
II) *
III)  ++ (post increment)
IV) <<
```

Question 13

What is output by the code segment to the right?

A) 1
B) 8
C) 16
D) 32
E) 64

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

Question 14

What is output by the code segment to the right?

A) -0.3
B) 0.3
C) 0.0
D) 0.7
E) 1.0

```
double d = 123.3;
double d2 = Math.floor(d);
double d3 = Math.ceil(d);
out.println(d3 - d);
```

Question 15

What is output by the code segment to the right?

A) [1, 3, 3, 1]
B) [1, 3, 5, 7]
C) [7, 5, 3, 1]
D) [7, 5, 5, 7]
E) There is no output due to an error.

```
ArrayList<Integer> ll = new ArrayList<>();
for (int i = 1; i <= 7; i += 2)
    ll.add(i);
for (int i = 3; i >= 0; i--)
    ll.set(i, ll.get(ll.size() - i - 1));
out.println(ll);
```

Question 16

What is output by the code segment to the right?

A) 4
B) 5
C) 6
D) 7
E) There is no output due to an infinite loop.

```
int abc = 1;
int bobby = 6;
for(int i=abc;i<bobby;i+=2) {
    bobby++;
    abc++;
}
out.println(abc);
```

Question 17

What is output by the code segment to the right?

A) 7
B) 10
C) 12
D) 13
E) There is no output due to an error.

```
String mess = "123^456^789-1";
out.println(mess.split("[^-]").length);
```

Question 18

What is output by the code segment to the right?

A) [5, 5, 4, 4] - 13
B) [4, 4, 3, 3] - 14
C) [e, e, d, d] - 14
D) [e, e, d, d] - 13
E) There is no output due to an error.

```
String name = "Bobby Billy Jenkins";
int[] ans = new int[4];
int num = 0;
for(char c : name.toCharArray()) {
    if(Character.isLowerCase(c))
        ans[num++ % ans.length] += 1;
}
out.print(Arrays.toString(ans));
out.println(" - " + num);
```

Question 19

What is output by the code segment to the right?

A) `1A@{`
B) `{@A1`
C) `1111`
D) Output cannot be determined until runtime.
E) There is no output due to an error.

```
ArrayList<String> al = new ArrayList<>();
al.add("1"); al.add("A");
al.add("@"); al.add("{");
Iterator it = al.iterator();
while(it.hasNext())
    out.print(it.next());
```

Question 20

What is the best case runtime of an insertion sort? N represents the number of elements in the array.

A) `O(N^2)`
B) `O(N*log(N))`
C) `O(N)`
D) `O(1)`
E) `O(log(N))`

Question 21

What is output by the code segment to the right?

A) `3, 6, 12, 24, 48, 96`
B) `3, 6, 12, 24, 48, 96, 192,`
C) `6, 12, 24, 48, 96,`
D) `6, 12, 24, 48, 96, 192,`
E) There is no output due to an error.

```
long l = 3;
while(l < 100) {
    out.println((l *= 2) + ", ");
}
```

Question 22

What is output by the code segment to the right?

A) `[3, 2, 5, 0, 9]`
B) `[0, 2, 3, 5, 9]`
C) `[9, 0, 5, 2, 3]`
D) `[9, 5, 3, 2, 0]`
E) There is no output due to an error.

```
LinkedList<Integer> y = new LinkedList<>();
y.add(3); y.add(2);
y.add(5); y.add(0);
y.add(9);
Collections.sort(y,Collections.reverseOrder());
out.println(y);
```

Question 23

What is output by the code segment to the right? "e" represents a blank space.

A) `0xe192`
B) `0xec0`
C) `192`
D) `ec0`
E) `%3x`

```
out.printf("%3x", 192);
```

Question 24

What is output by the code segment to the right?

A) `1`
B) `0`
C) `2`
D) `-2`
E) `-1`

```
int result = -1;
switch(result) {
    case -1: result += 3; break;
    case 2: result *= -1;
    case 3: result++;
}
out.println(result);
```

Question 25

What is output by the code segment to the right?

A) 10
B) 15
C) 45
D) 30
E) There is no output due to an error.

```
IntStream a = IntStream.of(1, 2, 3, 4, 5);
int j = a.map(x -> x*3).sum();
out.println(j);
```

Question 26

What is output by the code segment to the right?

A) 20
B) 25
C) 32
D) 0
E) There is no output due to an error.

```
Stream<Integer> s = Stream.of(1, 7, 2, 3, 6, 9,
5);
Function<Integer, Integer) a = x -> x*2;
Predicate<Integer> b = x -> x % 3 == 1;
Function<Integer, Integer> c = x -> x+1;
out.println(s.map(c.compose(a))
.distinct().filter(b)
.reduce((x,y) -> x^y).get());
```

Question 27

What is output by the code segment to the right?

A) true, true
B) false, true
C) true, -1
D) false, 0
E) true, 0

```
Integer a = 200;
int b = 200;
out.print((a == b) + ", ");
out.println(a.compareTo(b));
```

Question 28

What is output by the code segment to the right?

A) 5 0
B) 5 2
C) 3 0
D) 3 2
E) 3 3

```
Stack<Integer> st = new Stack<Integer>();
st.add(3); st.add(5);
st.add(3); st.add(7);
st.add(-1);
out.println(st.get(2)+ " " +st.indexOf(3));
```

Question 29

What is output by the code segment to the right?

A) 32
B) 202
C) 35
D) 40
E) 95

```
int n = 5;
int count = 0;
for(int i = 0; i < n; i++) {
    for (int j = 3; j < 2 * n; j++) {
          count++;
    }
}
out.println(count);
```

Question 30

What is output by the code segment to the right?

A) [0, 1, 2, 3, 4]
B) [0, 1, 2, 3, 4, 5]
C) null
D) []
E) [1, 2, 3, 4, 5]

```
ArrayList<Integer> a = new
ArrayList<Integer>();
for(int r = 0; r < 5; r++)
    a.add(r + 1);
ArrayList<Integer> b = new ArrayList<>();
b.addAll(a);
a.clear();
out.println(b);
```

Question 31

Which of the following lines will compile?

```
I)    Structure<Integer> s1 = new
      Structure<>(3);
II)   Structure<Structure> s2 = new
      Structure<>(null);
III)  Structure<Object> s3 = new
      Structure<>("A");
```

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

Question 32

What is output by the line to the right marked `//1` ?

A) [3, 2, 9, 5]
B) [1, 3, 2, 9, 5]
C) [9, 3, 5, 1, 2]
D) [9, 3, 5, 2]
E) There is no output due to an error.

Question 33

What is output by the line to the right marked `//2` ?

A) 5 9
B) 3 2
C) 1 3
D) 2 1
E) There is no output due to an error.

Question 34

The code to the right demonstrates which of the following Java concepts?

I) Generics
II) Overloading
III) Overriding

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

```
class Structure<E extends Comparable> {
    ArrayList<E> vals;

    Structure(E initial) {
        vals = new ArrayList<>();
        vals.add(initial);
    }

    void add(E val) {
        vals.add(
vals.get(0).compareTo(val)+1, val);
    }

    E remove() {
        vals.remove(vals.size() - 1);
    }

    public String toString() {
        return vals.toString();
    }
}

Structure<Integer> s = new
            Structure<Integer>(1);
s.add(3); s.add(2);
s.add(9); s.add(5);
out.println(s); //1
out.println(s.remove() + " " + s.remove()); //2
```

Question 35

Reduce the following boolean expression

```
(A && (A || !B)) ^ (A && (A || !B))
```

A) `true`
B) `false`
C) `A ^ B`
D) `A || B`
E) `B`

Question 36

What is returned by the method call `kill(17,23)`?

A) `40`
B) `19`
C) `21`
D) `23`
E) `17`

Question 37

What is returned by the method call `bill(10)` ?

A) `340`
B) `180`
C) `92`
D) `54`
E) There is no output due to an error.

```
public int kill(int c, int d){
  c^=d;
  d^=c;
  c^=d;
  return c+d;
}

public int bill(int x){
  if(x > 100) return x;
  return bill(kill(x,x+3) + kill(x,x+1));
}
```

Question 38

What is the 8 bit two's complement representation of -21?

Question 39

What is the minimum number of edges needed to create a graph with at least two distinct paths between every pair of nodes? N is the number of nodes in the graph.

Question 40

Solve the following prefix expression using integer division.

```
* * + * 3 4 3 \ 9 7 + 2 3
```