Note: Correct responses are based on Java, **J2sdk v 1.7.25**, 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

Which of these is NOT equivalent to $4F_{16} + 111_8$?

A. 162_{10} B. 230_8 C. 98_{16} D. 10011000_2 E. All are

QUESTION 2

What is the result of the expression shown?

A. `0.2` B. `0.6` C. `-0.6`
D. `6.2` E. None of these

```
out.println(16 % 9 - 4 * 0.2);
```

QUESTION 3

Which of the following choices will NOT produce the output to the right?

A. `out.printf("%d%% %s\n",100,"correct");`
B. `out.printf("%3d%%%8s%n",100,"correct");`
C. `out.printf("%-3d%% %s\n",100,"correct");`
D. `out.printf("%s%% %s%n",100,"correct");`
E. All of these choices will produce the output to the right.

```
100% correct
```

QUESTION 4

What is output by the code segment to the right?
A. `jeusktjfhoeduryehdjskt`
B. `jeuskdjfhoeduryehdjskt`
C. `jeuoedjfhoeduryehdjskt`
D. `jeuskdjfhskturyehdjoed`
E. None of these

```
String t = "jeuskdjfhskturyehdjskt";
t = t.replaceFirst("skt","oed");
out.println(t);
```

QUESTION 5

What is output by the code segment to the right?

A. `false` B. `true` C. There is no output due to an error.

```
boolean p = true;
boolean q = false;
out.println(!p&&q||!q);
```

QUESTION 6

Which of the following is NOT a possible output of the code segment to the right?

A. `47.00000000000005`
B. `47.000000000000064`
C. `47.00000000000007`
D. `47.000000000000035`
E. There is no output due to an error.

```
double d = 47.00000000000004;
double e = 47.00000000000009;
while(d<e)
 out.println(d=Math.nextAfter(d,e));
```

QUESTION 7

What is output by the code segment to the right?

A. `5` B. `32` C. `240` D. `325` E. `485`

```
long j = 5;
char a = '0';
out.println(j*=a);
```

QUESTION 8

Which of the following statements will correctly fill <statement> in order for **win** to be the output?

A. `int a = 15, b = 4, c = 2;`
B. `int a = 15, b = 4, c = 3;`
C. `int a = 15, b = 4, c = 6;`
D. `int a = 15, b = 5, c = 6;`
E. `int a = 15, b = 5, c = 5;`

```
<statement>
if(a%b > a/c)
  out.println("win");
else
  out.println("lose");
```

QUESTION 9

What is output by the code segment to the right?

A. `7 11 15 19` B. `7 11 15 19 23`
C. `3 7 11 15 19` D. `3 7 11 15 19 23`
E. There is no output due to an error.

```
int x = 3;
for(;x<20;)
 out.print((x+=4)+" ");
```

QUESTION 10

What is output by the code segment to the right?

A. `2 6 10 14 18` B. `1 3 5 7 9` C. `0 0 0 0 0`
D. There is no output due to a compile time error.
E. There is no output due to a run time error.

```
int i = 0;
long[]list1={1,3,5,7,9};
long[]list2=new long[5];
for(long x:list1)
  list2[++i]=x*2;
for(long x:list2)
  out.print(x+" ");
```

QUESTION 11

Using the two initial code statements, which of the choices below will NOT work properly due to an error?

```
String s = "2 3 4 5 6 5 6 7 8 9 0";
Scanner k = new Scanner(s);
```

A.
```
int n = k.nextInt();
for(int i = 0;i<n;i++){
      int x = k.nextInt();
      for(int j = 0;j<x;j++)
            out.print(k.nextInt()+" ");
}
```

B.
```
int n = k.nextInt();
while(n-->0){
      int x = k.nextInt();
      while(x-->0)
            out.print(k.nextInt()+" ");
}
```

C.
```
while(k.hasNext())
      out.print(k.nextInt()+" ");
```

D.
```
while(k.hasNext())
      out.print(k.nextInt()+" "+k.nextInt()+" ");
```

E.
```
while(k.hasNext())
      out.print(k.nextInt()+" "+k.nextLine()+" ");
```

QUESTION 12

Which of the choices below is NOT part of the output by the code segment to the right?

A. `5 4.5` B. `40 36.0` C. `80 72.0`
D. `160 144.0` E. `320 288.0`

```
int j = 5;
double k = 4.5;
while(j-k<20){
 j*=2;k*=2;
 out.println(j+" "+k);
}
```

QUESTION 13

What is output by the code segment to the right?

A. `1` B. `6` C. `12` D. `768`

E. There is no output due to an error.

```
int a = 3, b = 2;
out.println(a<<2+b>>3);
```

QUESTION 14

Choosing the most effective, yet the most efficient data type to use is important since memory storage space is often limited, especially when managing large quantities of data. As a software engineer, knowing the capabilities of each data type is important in order to accomplish this crucial task. Which of the following data types would work best (most effective and most efficient) for storing data that represents **whether or not an inventory item in a store is taxable?**

A. char B. boolean C. int D. double E. String

QUESTION 15

What is output by the code segment to the right?

A. `9 3 5 7 2 1 6`
B. `9 3 7 2 4 1 6`
C. `4 1 6`
D. `9 3 5`
E. There is no output due to an error

```
int [] list={9,3,5,7,2,4,1,6};
ArrayList<Integer> aList = new
  ArrayList<Integer>();
for(int x:list)
  aList.add(x);
aList.remove(5);
for(Integer x:aList)
  out.print(x+" ");
```

QUESTION 16

How many ordered pairs make the boolean expression to the right true?

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

$$\overline{\bar{A} + \bar{B}}$$

QUESTION 17

What is output by the code segment to the right?

A. `9.0` B. `48.0` C. `57.0` D. `105.0`

E. There is no output due to an error.

```
char x = '9';
int y = x - 48;
double z = 57.0;
out.println(z-x+y);
```

QUESTION 18

What is output by the code to the right?

A. `2 2 2.6` B. `3 3 2.6` C. `9 3 5.2`

D. `9 2 5.2` E. None of these

```
double[][]r={{5.2,3.8,-2.7,-0.92},
          {3.1,2.6,2.6},{8.3,9.8}};

out.println(r.length+" "+r[2].length+
        " "+ r[1][1]);
```

QUESTION 19

Which of the following choices represents the decimal equivalent of the two's complement binary value 10010001?

A. -107 B. -108 C. -109 D. -110 E. -111

QUESTION 20

In the chart to the right, representing the most restrictive bound on the runtime of each process for each scenario, where N represents the number of items in a data structure, how many scenarios have a runtime of O(N log N)?

A. 3 B. 4 C. 5 D. 6 E. 7

Algorithm	Scenarios/Big O Time Complexity		
	Best	Avg	Worst
Quick Sort	?	?	?
Merge Sort	?	?	?
Insertion Sort	?	?	?
Selection Sort	?	?	?

QUESTION 21

Which of the sorts listed to the right would be most efficient to use when a list is already sorted, or almost in sorted order?

A. Quick B. Merge C. Insertion D. Selection

E. All are equally efficient in this case.

QUESTION 22

In the output for the code segment to the right, how many values will be shown?

A. 8 B. 9 C. 10 D. 11 E. 12

```
int a = 0;
while (a<100){
      out.print(a+" ");
      for(int x=1;x<5;x++)
            a+=x;
}
```

QUESTION 23

What is output by the code immediately below **<statement 1>** in the code segment to the right?

A. -6 B. -5 C. 4 D. 5 E. None of these

QUESTION 24

What is output by the code immediately below **<statement 2>** in the code segment to the right?

A. -4 B. -3 C. 3 D. 4 E. None of these

```
int [] list = {4,2,3,7,0,5,9,8,6,1};
Arrays.sort(list);
<statement1>
out.println(Arrays.binarySearch
            (list,3,5,6));
<statement2>
out.println(Arrays.binarySearch
            (list,2,9,3));
```

QUESTION 25

Which of the statements below is NOT an accurate description of the variables **a** and **b** in the code segment to the right?

A. The variable **a** exists only during the execution of `mystA5`
B. The variable **b** exists before, during, and after the call to `mystA5`
C. The variable **a** is a formal parameter
D. The variable **b** is passed by reference
E. The variable **b** is an actual parameter

QUESTION 26

What is output by the code segment to the right?

A. 25 2500 25
B. 25 250 25
C. 25 2500 250
D. There is no output due to a compile error
E. There is no output due to a runtime error

```
public static int mystA5(int a)
{
      a*=10;
      return a*10;
}

////////////////////////////////////
//client code
int b = 25;
out.print(b+" "+mystA5(b)+" ");
out.println(b);
```

QUESTION 27

What is output by the code segment to the right?

A. `-bc---bc---bc-`
B. `-bc---bc---bc--`
C. `-bc---bc---b-c-`
D. `a-def-ghi-j-kl-`
E. `a--def--ghi-j-kl-`

```
String s = "abcdefbcghibjckl";
args=s.split("[a-z&&[^bc]]");
for(String t:args)
  out.print(t+"-");
out.println();
```

QUESTION 28

In the code segment shown to the right, which statement correctly replaces `<statement1>` to implement the **`one`** method?

A. `void one(){out.print("one")}`
B. `void one(){out.print("one");}`
C. `public void one(){out.print("one");};`
D. `public void one(){out.print("one")}`
E. `public void one(){out.print("one");}`

QUESTION 29

In the code segment to the right, which statement below correctly replaces `<statement2>` to implement the **`two`** method?

A. `int two(){return 0;}`
B. `int two(){return 0}`
C. `public int two(){return 0;}`
D. `public int two(){return 0}`
E. `public int two(){return 0};`

QUESTION 30

Assuming `<statement1>` and `<statement2>` have been correctly implemented, which of the choices below correctly replaces `<call 1>` and `<call 2>` so that the output is: **`one0`**

A.
```
one();
out.println(two());
```
B.
```
ette.one();
out.println(ette.two());
```
C.
```
Smurfette.one();
out.println(Smurfette.two());
```
D.
```
Smurf ette.one();
out.println(Smurf ette.two());
```
E. None of these

```
interface Stuff
{
      void one();
      int two();
}

class Smurf implements Stuff
{
  <statement1>
  <statement2>
}

////////////////////////////////
//client code
Smurf ette = new Smurf();
<call 1>
<call 2>
```

QUESTION 31

Using the generic push and pop sequence below for both a stack and a queue, after which pop command will the sums be equal for all popped items of the stack and the queue?

`Push 3, Push 5, Push 7, Pop x, Push 6, Push 3, Pop x, Pop x, Pop x, Push 4, Pop x`

A. Pop #1
B. Pop #2
C. Pop #3
D. Pop #4
E. Pop #5

QUESTION 32

Which choice below correctly represents the two remaining outputs of the code segment to the right?

[red, orange, yellow, green, blue, indigo, violet]
<output 2>
<output 3>

A. [red, orange, yellow, green, blue, indigo, violet]
[blue, green, indigo, orange, red, violet, yellow]

B. [blue, green, indigo, red, orange, yellow, violet]
[blue, green, indigo, orange, red, violet, yellow]

C. [red, orange, yellow, green, blue, indigo, violet]
[blue, green, indigo, red, orange, yellow, violet]

D. [blue, green, indigo, red, orange, yellow, violet]
[red, orange, yellow, green, blue, indigo, violet]

E. [blue, green, indigo, orange, red, violet, yellow]
[blue, green, indigo, red, orange, yellow, violet]

```
String [] list = {"red","orange",
        "yellow","green","blue",
        "indigo","violet"};

ArrayList<String> sv;
sv = new ArrayList<String>();

for(String s:list)
   sv.add(s);

out.println( sv );//output 1

PriorityQueue<String> rb;
rb = new PriorityQueue<String>( sv);
out.println( rb ); //output 2

sv.clear();

while(!rb.isEmpty())
   sv.add(rb.remove());
out.println( sv ); //output 3
```

QUESTION 33

Assuming that the ListNode class contains a value and a reference to the next ListNode, what is output by the code segment to the right?

A. 4 3 7 9 5
B. 5 4 3 7 9
C. 9 7 3 4 5
D. 5 9 7 3 4
E. There is no output due to an error.

```
ListNode ln =
  new ListNode(4,
    new ListNode(3,
      new ListNode(7,
        new ListNode(9,null))));

ln = new ListNode(5,ln);
ListNode m = ln;
while(m!=null){
      out.print(m.val+" ");
      m=m.next;
}
```

QUESTION 34

Which of the following values is NOT a possible outcome of the code segment to the right?

A. 6 B. 10 C. 7

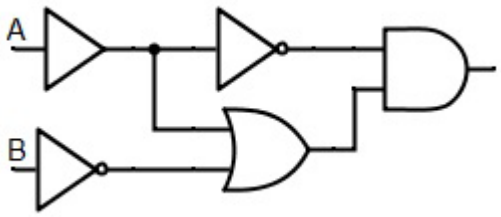
D. 21 E. 18

```
Random r = new Random();
out.print(r.nextInt(15)+6);
```

QUESTION 35

Which of the choices below correctly represents the diagram on the right?

A. $A * (A + \overline{B})$
B. $\overline{A} * (\overline{A} + \overline{B})$
C. $\overline{A} * (A + \overline{B})$
D. $\overline{A} + A * \overline{B}$
E. $A + A * \overline{B}$



QUESTION 36

Which of the choices below is a possible output for the code segment to the right?

A. `[3, 6, 5, 9, 8, 6, 2, 3, 5, 4, 6, 7, 5, 0]`
B. `[3, 6, 5, 9, 8, 6, 2, 3, 5, 4, 6, 7, 5, 0, null]`
C. `[0, 2, 3, 4, 5, 6, 7, 8, 9]`
D. `[null, 0, 2, 3, 4, 5, 6, 7, 8, 9]`
E. There is no output due to an error.

```
int [] list =
   {3,6,5,9,8,6,2,3,5,4,6,7,5,0};

Set<Integer> set;
set = new HashSet<Integer>();

for(int x:list)
   set.add(x);

set.add(null);
out.println(set);
```

QUESTION 37

What is the least restrictive running time for retrieving an item from a hash set data structure, such as the one in the code segment to the right?

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

QUESTION 38

What is output by the code segment to the right?

A. 1
B. 2
C. 3
D. 0
E. -1

```
public static int seqSearch(
                  int[] list, int target)
{
 for (int j = 0; j < list.length; j++)
 {
   if (list[j] == target)
      return j;
 }
 return -1;
}

////////////////////////////////////
//client code
int[]  list = {5,7,3,9,4,6};
out.println(seqSearch(list,3));
```

QUESTION 39

Free Response Question: Using boolean identities, simplify the following expression as much as possible.

$$(A \oplus B) * (\bar{A} + B)$$

QUESTION 40

Free Response Question: In the graph shown below, how many paths are there of length one?