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 $110_2 + 100010_2$?

A. 40_{10} B. 46_8 C. 28_{16} D. 101000_2 E. All are equivalent

QUESTION 2

What is output by the code to the right?

A. 4 B. 4.8

C. 5 D. 5.0

E. There is no output due to a compile error.

```
int h = 24;
h/=5;
out.println(h);
```

QUESTION 3

What is output by the code to the right?

A. 3 B. 4 C. 4.0

D. There is no output due to a compile error.

E. There is no output due to a runtime error.

```
Double [] list = {1.0,2.0,3.0,4};
out.println(list[3]);
```

QUESTION 4

What is output by the code to the right?

A. 369 B. 36912

C. 6912 D. infinite loop

E. There is no output.

```
int k = 3;
do
{
  k+=3;
  out.print(k);
}
while (k!=12);
```

QUESTION 5

What is output by the code to the right?

A. 0 B. 1 C. 5 D. 6 E. 7

```
String s = "beachbum";
out.println(s.indexOf(98,1));
```

QUESTION 6

What is output by the code to the right?

A. 0.12.34.56.7 B. 2.36.74.54.5

C. 4.54.54.54.5 D. 6.74.52.30.1

E. There is no output due to a runtime error.

```
double [] list = {0.1,2.3,4.5,6.7};
list[3]=list[2];
list[1]=list[3];
list[0]=list[1];
for(double d:list)
  out.printf("%.1f",d);
```

QUESTION 7

For which initial values of p and q will this expression output true?

I. `p=false;q=false`
II. `p=false;q=true`
III. `p=true;q=false;`
IV. `p=true;q=true ;`

A. I and IV only
B. II and III only
C. IV only
D. I, II, and III only
E. All will work.

```
boolean p = ?;
boolean q = ?;
out.println(p^q);
```

QUESTION 8

For which of these inputs will the final value of sum be greater than zero?

A. `"a"` B. `"aa"`

C. `"bb"` D. `"cccc"`

E. `""`

```
String s = <string value>;
int sum = 0;
switch(s)
{
  case "a"    : sum += s.length();
  case "bb"   : sum -= s.length();
  case "cccc" : sum *= -s.length();
  case ""     : sum--;
}
out.println(sum);
```

QUESTION 9

What is output by the code to the right?

A. `3.1` B. `5.2` C. `-5.2`

D. `-2.1` E. `-3.1`

```
out.println(Math.min(-5.2,3.1));
```

QUESTION 10

Which statement will correctly output the value 6 from the array shown to the right?

A. `out.print(a[1][2]);` B. `out.print(a[2][3]);`

C. `out.print(a[5]);` D. `out.print(a[2][1]);`

E. `out.print(a[3][2]);`

```
int[][]a={{1,2,3},{4,5,6,7},{8,9}};
```

QUESTION 11

Which of the following correctly replaces **<statement1>** in the Guitar class definition on the right ?

A. `public void`

B. `public int`

C. `private void`

D. `private int`

E. `public static int`

QUESTION 12

Which of the following correctly replaces **<statement2>** in the Guitar class definition on the right ?

A. `( );`

B. `(int n);`

C. `( )`

D. `(String s)`

E. `(int n)`

QUESTION 13

Which of the following correctly replaces **<statement3>** in the Guitar class definition on the right ?

A. `type = s;`

B. `numStrings = n;`

C. `return type;`

D. `return numStrings;`

E. `return 6;`

```
class Guitar
{
  private String type;
  private int numStrings;
  public Guitar()
  {
     type = "acoustic";
     numStrings = 6;
  }
  public Guitar(int n)
  {
     this();
     numStrings = n;
  }
  public Guitar(int n, String s)
  {
     this(n);
     type = s;
  }
  public String toString()
  {
     return type + ": " +
        numStrings + " string";
  }
<statement1>setNumStrings<statement2>
  {
          <statement3>
  }
}
```

QUESTION 14

What is output by the code to the right?

A. 0 B. 15

C. 25 D. 34

E. 1073741823

```
int d = 30;
d = d ^ 15 << 1;
out.println(d);
```

QUESTION 15

What is output by the code to the right?

A. 0 B. 39 C. 40

D. 120 E. 121

```
int j = 0;
do{
  j+=2*j;
  j++;
}
while(j<50);
out.println(j);
```

QUESTION 16

Which term best describes the method type in the code shown to the right?

I. static method
II. void method
III. return method
IV. mutator method

A. I only

D. II only

C. III only

D. I and III only

E. II and IV only

```
static int stuff(int x)
{
  if(x%9>5)
     return (x%9-5);
  if(x%9<5)
     return (x%9+5);
  return (x%9);
}

//client code
out.print(stuff(9));
out.print(stuff(8));
out.print(stuff(14));
```

QUESTION 17

What is output by the client code to the right?

A. -5593680105

B. 439

C. 651

D. 535

E. 9814

QUESTION 18

Which of these statements will return the substring "R"?

A. s.substring(6);
B. s.substring(7);
C. s.substring(6,6);
D. s.substring(6,7);
E. s.substring(7,8);

```
String s = "FenderRumble";
```

QUESTION 19

What is output by the code to the right?

A. -2 B. -3 C. 21 D. 22 E. 25

```
int d = 9;
int f = 60;
int g = 31;
out.println(g-f%d);
```

QUESTION 20

What is output by the code to the right?

A. `000 010 101 111`

B. `000 011 100 111`

C. `001 010 101 110`

D. `001 011 101 110`

E. `000 010 101 110`

```
for(int p = 0; p <= 1; p++)
 for(int q = 0; q <= 1; q++)
  out.print(""+p+q+(p&q|q)+" ");
```

QUESTION 21

What is output by the code to the right?

A. `1` B. `2` C. `3` D. `1.0` E. `1.5`

```
double g = 28.5;
out.println(g%9);
```

QUESTION 22

What is output by the code to the right?

A. `0.79` B. `1.05` C. `1.57` D. `3.14` E. `6.28`

```
d = Math.toRadians(180.0);
out.printf("%.2f\n",d);
```

QUESTION 23

What is output by the code to the right?

A. `2147483644`

B. `-2147483645`

C. `11001111111111111111111111111111` (32 digits)

D. `11000000000000000000000000000000` (32 digits)

E. `1100`

```
int x = 12 << 32;
String s = Integer.toBinaryString(x);
out.println(s);
```

QUESTION 24

What is output by the code to the right?

A. `4 null`

B. `4 6`

C. `5 null`

D. `5 6`

E. There is no output due to a runtime error.

```
ArrayList lost = new ArrayList(5);
lost.add(null);
lost.add(new Integer(6));
lost.add("ball");
lost.add(4.7);
out.println(lost.size()+"
"+lost.get(1));
```

QUESTION 25

Find f(10,5) according to the recursive function definition shown on the right. You may use the space below to do your work.

f(10,5) =

$$f(x,y) = \begin{cases} f(x-y,y-1)+2 & \text{when } x>y \\ x+y & \text{otherwise} \end{cases}$$

A. `5` B. `6` C. `7`

D. `8` E. `10`

QUESTION 26

What is output by the code to the right?

A. `il` B. `vain`

C. `ilovetopaint`

D. There is no output due to a runtime error

E. There is no output due to a compile error

```
String s = "ilovetopaint";
String [] ar = s.split("[pote]");
out.println(ar[1]+ar[5]);
```

QUESTION 27

What is output by the code to the right?

A. `0` B. `5`

C. `100` D. `dead`

E. `walking`

```
String b = (100%5==0)?"walking"
                     :"dead";
out.println(b);
```

QUESTION 28

What is output by the code to the right?

A. `-1` B. `1`

C. `-15` D. `15`

E. `false`

```
s = "SperryRand";
t = "SpecialK";
out.println(s.compareTo(t));
```

QUESTION 29

A. `nine` B. `9`

C. `ten` D. `sepuluh`

E. `null`

```
Map<Integer,String> m =
  new HashMap<Integer,String>();
m.put(10,"ten");
m.put(14,"fourteen");
m.put(9,"nine");
m.put(10,"sepuluh");
out.println(m.get(0));
```

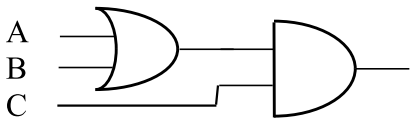
QUESTION 30

Which of the following logical statements is represented by the digital electronics diagram on the right ?

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

C. A ^ B || C D. (A || B) && C

E. A && B ^ C



QUESTION 31

On the right is a boolean expression using generic notation. Which of the expressions below represents the simplest form of this expression ? (Note : * means AND, + means OR, ⊕ means XOR)

$(A \oplus B)\ (\ A + B)$

(this translates to ***"A xor B and A or B)"***)

A. $\overline{A} + \overline{B}$ B. $A \oplus B$ C. $A\overline{B} + \overline{A}B$

D. False E. A+B

QUESTION 32

In a typical binary search process, in how many steps will the value 8 be found in the array shown on the right?

A. 3 B. 4

C. 5 D. 6

E. 7

```
0 1 2 3 4 5 6 7 8 9 10 11 12 13
```

QUESTION 33

Which statement below best describes the minimum required <implementation> of class B for the class structure shown on the right?

A. class B is only required to define method **`two()`**.
B. class B is not required to implement anything.
C. class B is required to implement method **`two()`** and override method **`one()`**.
D. class B is only required to override method **`one()`**.
E. This class structure is invalid.

QUESTION 34

Suppose all is correctly defined with this class structure so that method **two()** returns the value 2. What is the output for the client code shown on the right?

A. 0 B. 5
C. 20 D. 40
E. There is no output due to a runtime error.

QUESTION 35

Which of the following is an **INVALID** class B definition?

I.
```
class B extends A{
      int two(){
         return 2;
      }}
```
II.
```
class B implements A{
      x=1;
      int two(){
         return 2;
      }}
```
III.
```
class B extends A{
      int one(){
         return 5;
      }
      int two(){
         return 2;
      }}
```
IV.
```
class B extends A{
      int x = 4;
      int one(){
         return 5;
      }
      int two(){
         return 2;
      }}
```

A. I is invalid
B. II is invalid
C. III is invalid
D. IV is invalid
E. All of these are valid

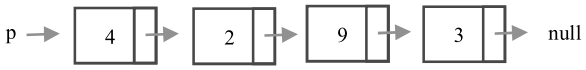
```
abstract class A
{
  int x = 2;
  int one()
  {
     return 5;
  }
  abstract int two();

}
class B extends A
{
  //<implementation>
}

//////////client code///////////////
B bop = new B();
out.println(bop.one()*bop.two()
              *bop.x);
```

QUESTION 36

Suppose a linked list has been implemented as shown in the diagram on the right, with public fields **`data`** and **`next`**. What is the output of the statement below?

```
out.print(p.next.next.data);
```

A. 2 B. 3 C. 4 D. 5 E. 9



QUESTION 37

What is output by the code to the right?

A. 3null

B. 3false

C. 3true

D. 4false

E. 4true

```
Set<Integer> sa = new
  TreeSet<Integer>();
sa.add(4);
sa.add(5);
sa.add(4);
sa.add(6);
sa.add(7);
sa.remove(4);
out.print(sa.size());
out.println(sa.contains(6));
```

QUESTION 38

What is the output of this code if the value of ***<keyboard input>*** is 3.14?

A. Bad data.

B. All is good.

C. Bad data. All is good.

D. There is no output.

E. There is no output due to a runtime error.

```
double tx;
try{
  tx = <keyboard input>;
}
catch(Exception ee){
  out.print("Bad data. ");
}
finally{
  out.print("All is good. ");
}
```

QUESTION 39

On the right is a binary tree implementing a max heap, with the 9 in position 0, the 7 in position 1, and the 5 in position 2. The last element added was a 12. In what position does the value 12 settle when the min heap is reestablished in the sifting up process?

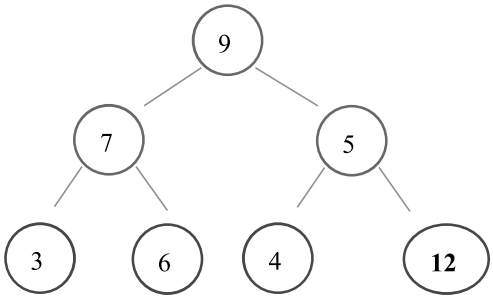
A. position 0

B. position 1

C. position 2

D. position 5

E. position 6

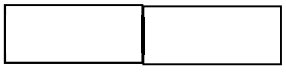


QUESTION 40

OPEN ENDED QUESTION – Using the generic push and pop sequence given on the right (**push** to mean Java's ***enqueue***, **pop** to mean Java's ***dequeue***), process the commands shown on the right into a queue and indicate the ***last value popped*** and which value would be the ***next one popped***.

*Find the **two** answers and write them on your answer sheet **correctly labeled**. If using a ScanTron form, out to the side of the bubbles, also **correctly labeled**. If not labeled, the order you put your answers will be assumed to be **last value popped**, then **next value to be popped**.*

Last value popped Next value to be popped



Push 9
Push 7
Pop x
Push 5
Push 8
Push 6
Pop x
Pop x