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 $11110_2 + 11011_2$?

A. 57_{10} B. 71_8 C. 39_{16} D. 111101_2 E. All are equivalent

QUESTION 2

What is output by the code to the right?

A. `19 32` B. `32 13`

C. `19 13` D. `32 19`

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

```
long b = 19;
int c = 13;
b+=c;
out.println(b+" "+c);
```

QUESTION 3

What is output by the code to the right?

A. `4` B. `3` C. `4.0`

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

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

```
Integer [] list = {1,2,3,4.0};
out.println(list[3]);
```

QUESTION 4

What is output by the code to the right?

A. `4 3 2 1` B. `4 3 2`

C. `5 4 3 2` D. `5 4 3`

E. There is no output.

```
int j = 5;
do
{
  out.print(--j + " ");
}
while (j>1);
```

QUESTION 5

What is output by the code to the right?

A. `gBad` B. `reak` C. `Brea` D. `a` E. `k`

```
String s = "BreakingBad";
out.println(s.charAt(4));
```

QUESTION 6

What is output by the code to the right?

A. `aead` B. `abcd`

C. `abeb` D. `cecd`

E. There is no output.

```
char [] list1 = {'a','b','c','d'};
char [] list2 = list1;
list2[2] = 'e';
list1[3] = list2[1];
for(char a:list1)
     out.print(a);
```

QUESTION 7

What is output by the code to the right?

A. `false false` B. `false true`

C. `true false` D. `true true`

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

```
boolean p = true;
boolean q = true;
p = p^q;
out.println(p + " " + q);
```

QUESTION 8

What is output by the code to the right?

A. `yum` B. `yumyom`

C. `burp` D. `chomp`

E. `yumyomchompburp`

```
String s1 = "sweet";
switch(s1)
{
  case "sweet":out.print("yum");
  case "sour" :out.print("yom");
               break;
  case "spicy":out.print("chomp");
  default     :out.print("burp");
}
```

QUESTION 9

What is output by the code to the right?

A. `3.1` B. `5.2` C. `8.3`

D. `2.1` E. `2.5`

```
out.println(Math.max(5.2,3.1));
```

QUESTION 10

What is output by the code to the right?

A. `999` B. `333`

C. `342` D. `101010`

E. `231`

```
int[][]grid={{1,2,3},{4,5,6,7},
             {8,9}};
out.println(grid[0].length + "" +
            grid[1].length + "" +
            grid[2].length);
```

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>getNumStrings<statement2>
  {
          <statement3>
  }
}

////////////////////////////////
////client code
Guitar g = new Guitar(5,"bass");
out.println(g);
```

QUESTION 14

What is output by the code to the right?

A. `7` B. `9`

C. `15` D. `12`

E. `31`

```
int d = 25;
d = d | 15 & 7;
out.println(d);
```

QUESTION 15

What is output by the code to the right?

A. `99` B. `8` C. `7`

D. `100` E. `0`

```
int e = 0, f = 1;
while(f<100){
  e++;
  f*=2;
}
out.println(e);
```

QUESTION 16

Which term best describes the variable type for **a** in the client code shown?

A. actual parameter

B. formal parameter

C. instance field

D. class variable

E. temporary variable

QUESTION 17

What is output by the client code to the right?

A. `30 1 7`

B. `30 1 1 7`

C. `30 1 6 1 9 7`

D. `30 1 6 45 1 9 35 1 7`

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

```
static void stuff(int x)
{
  if(x%2==0)
     out.print(x*5+" ");
  else
  if(x%3==0)
     out.print(x/5+" ");
  else
     out.print(x+" ");
}
//client code
int a = 6;
stuff(a);
a+=3;
stuff(a);
a-=2;
stuff(a);
```

QUESTION 18

Which of these statements will return the substring "`Probe`"?

I. `s.substring(7,12);`
II. `s.substring(8);`
III. `s.substring(8,13);`
IV. `s.substring(7,13);`
V. `s.substring(7);`

A. I and V only
B. II only
C. III only
D. II and III only
E. IV only

```
String s = "Cassini_Probe";
```

QUESTION 19

What is output by the code to the right?

A. `2.9` B. `4.5` C. `19.5` D. `4.9` E. `3.2`

```
long k = 12;
int m = 5;
double p = 2.5;
out.println(p+k/m);
```

QUESTION 20

What is output by the code to the right?

A. `001 010 101 111`

B. `000 010 100 111`

C. `001 010 101 110`

D. `001 011 100 110`

E. `000 010 101 111`

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

QUESTION 21

Based on the value of x in the code on the right, which of the following statements will output only the value 6 ?

I. `out.println(x%1000/100);`
II. `out.println(x/100%10);`
III. `out.println(x/1000%10);`

A. I only
B. II only
C. III only
D. I and II only
E. I and II and III

```
int x = 49627;
```

QUESTION 22

What is output by the code to the right?

A. `360.0` B. `180.0` C. `90.0`
D. `45.0` E. `0.0`

```
double d = Math.toDegrees(Math.PI*2);
out.printf("%.1f\n",d);
```

QUESTION 23

What is output by the code to the right?

A. `2147483647`
B. `-2147483648`
C. `11110000000000000000000000000000`(4 1s, 32 zeroes)
D. `11111111111111111111111111111111` (32 1s)
E. `1111`

```
int x = 15 << 32;
String s = Integer.toBinaryString(x);
out.println(s);
```

QUESTION 24

What is output by the code to the right?

A. `true0.0`
B. `true2.3`
C. `true3.1`
D. `false2.3`
E. `false4.2`

```
ArrayList <Double> list;
list = new ArrayList<Double>();
out.print(list.isEmpty());
list.add(2.3);
list.set(0,4.2);
list.add(3.1);
list.remove(0);
out.print(list.get(0));
```

QUESTION 25

Find f(12,6) according to the recursive function definition shown on the right. You may use the space below to do your work.

f(12,6) =

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

A. `5` B. `6` C. `7`
D. `9` E. `12`

QUESTION 26

What is output by the code to the right?

A. `Fry` B. `FryFa`

C. `FreettyFall` D. `FreeFallinTomPetty`

E. There is no output due to a compile error

```
String s = "FreeFallinTomPetty";
String [] ar = s.split("[elt]+");
out.println(ar[0]+ar[ar.length-1]
           +ar[1]);
```

QUESTION 27

What is output by the code to the right?

A. `1` B. `33`

C. `100` D. `bad`

E. `breaking`

```
String bb = (100%3==0)?"breaking"
                      :"bad";
out.println(bb);
```

QUESTION 28

What is output by the code to the right?

A. `false` B. `-8`

C. `8` D. `-1`

E. `1`

```
String s = "KarelJRobot";
String t = "Kilamanjaro";
out.println(s.compareTo(t));
```

QUESTION 29

A. `10` B. `20`

C. `ten` D. `sepuluh`

E. `tensepuluh`

```
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(10));
```

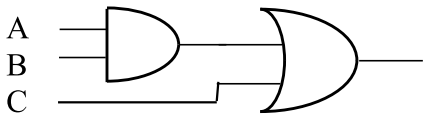
QUESTION 30

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)

A. $\overline{A}$ B. 0 C. $\overline{A} * \overline{B}$ D. $\overline{A}(\overline{A}*\overline{B})$ E. $\overline{A}+\overline{B}$

$$\overline{A}\,\overline{(A + B)}$$

(this translates to ***"not A and not (A or B)"***)

QUESTION 32

In a typical binary search process, in how many steps will the value 5 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 **`one()`**.
B. class B is not required to implement anything.
C. class B is required to implement method **`one()`** and override method **`two()`**.
D. class B is only required to override method **`two()`**.
E. This class structure is invalid.

QUESTION 34

Suppose all is correctly defined with this class structure so that method one()returns the value 4. 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.

```
abstract class A
{
  int x = 2;
  abstract int one();
  int two()
  {
     return 5;
  }
}
class B extends A
{
  //<implementation>
}

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

QUESTION 35

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

I.
```
class B extends A{
      int one(){
         return 4;
      }}
```
II.
```
class B extends A{
      x=1;
      int one(){
         return 4;
      }}
```
III.
```
class B extends A{
      int one(){
         return 4;
      }
      int two(){
         return 6;
      }}
```
IV.
```
class B extends A{
      int x = 4;
      int one(){
         return 4;
      }
      int two(){
         return 6;
      }}
```

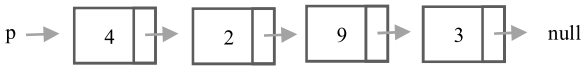
A. I is invalid
B. II is invalid
C. III is invalid
D. IV is invalid
E. All of these are valid

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.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(6);
out.print(sa.size());
out.println(sa.contains(6));
```

QUESTION 38

What is the output of this code if the value of ***<keyboard integer 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.

```
int tx;
try{
  tx = <keyboard integer 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 min heap, with the 1 in position 0, the 7 in position 1, and the 5 in position 2. The last element added was a 2. In what position does the value 2settle when the min heap is reestablished in the sifting up process?

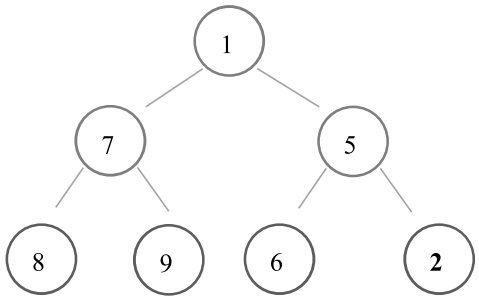
A. position 0

B. position 1

C. position 2

D. position 5

E. position 6

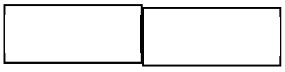


QUESTION 40

OPEN ENDED QUESTION – Using the ***enqueue*** and ***dequeue*** sequence given on the right, process the commands shown into a standard queue and indicate the ***last value dequeued*** and which value would be the ***next one dequeued***.

*Find the **two** answers and write them on your answer sheet **correctly labeled**. If using a ScanTron form, write them 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 dequeued**, then **next value to be dequeued**.*

Last value dequeued Next value to be dequeued



```
enqueue 3
enqueue 5
enqueue 4
dequeue x
enqueue 7
dequeue x
dequeue x
enqueue 9
```