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 $11101101_2 + 110100_2$?

A. 100100011_2 B. 121_{16} C. 441_8 D. 289_{10} E. `All are`

QUESTION 2

What is the result of the expression shown?

A. `8` B. `4` C. `0` D. `7` E. `3`

```
8 / 9 + 7 % 10 = _____
```

QUESTION 3

What is the output of the code segment shown?

A. `9hello23` B. `54hello23` C. `9hello5`
D. `54hello5` E. There is no output due to an error.

```
out.println(5 + 4 + "hello" + 2 + 3);
```

QUESTION 4

What is output by the code to the right?

A. `true2` B. `true1` C. `false1`
D. `false2` E. There is no output due to an error

```
String s = "ChopinNocturnes";
out.println(s.contains("pin")+""
          +s.indexOf("hop"));
```

QUESTION 5

What is output by the code to the right?

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

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

QUESTION 6

What is output by the code to the right?

A. `44` B. `45` C. `-45` D. `-44`
E. There is no output due to an error.

```
int x = -45;
out.println(Math.abs(x));
```

QUESTION 7

What is output by the code to the right?

A. `13` B. `13.5` C. `14.0` D. `14`
E. `13.0`

```
int i = 9;
double d = 4.5;
out.printf("%.1f",i + d);
```

QUESTION 8

What is output by the code to the right?

A. `SAME` B. `MORE` C. `LESS`

```
double d = 3.14;
double p = Math.PI;
if(d==p)       out.println("SAME");
else if(d < p) out.println("LESS");
else           out.println("MORE");
```

QUESTION 9

How many stars will be output by the code segment shown?

A. `23` B. `21` C. `20` D. `22`
E. None of these

```
for(int x = 0;x<=21; x++)
        out.print("*");
out.println();
```

QUESTION 10

How many non-positive digits will be output by the code segment shown?

A. 1 B. 3 C. 6 D. 7 E. 4

```
int list[] = new int [10];
list[1]=9;list[3]=3;list[5]=-
6;list[7]=2;
for(int i:list)
  out.print(i);
```

QUESTION 11

Which of the code segments shown is a correct way to set up input from the data file "stuff.dat"?

A.
```
public static void main(String [] args)
{
      Scanner f = new Scanner(new File("stuff.dat"));
.
.
```

B.
```
public static void main(String [] args)
      throws FileNotFoundException
{
      Scanner f = new Scanner(new File("stuff.dat"));
.
.
```

C.
```
public static void main(String [] args) throws IOException
{
      Scanner f = Scanner(File("stuff.dat"));
.
.
```

D.
```
public static void main(String [] args)
      throws FileNotFoundException
{
      Scanner = new Scanner(new File("stuff.dat"));
.
.
```

E.
```
public static void main(String [] args)
      throws FileNotFoundException
{
      f = new Scanner(new File("stuff.dat"));
.
.
```

QUESTION 12

What is the 3rd output value of m in the code segment shown?

A. 33 B. 20 C. 4 D. 7 E. 12

```
int k = 0,m = 0;
while(k<25)
{
 m+=k+1;
 k+=m+1;
 out.println(k+" "+m);
}
```

QUESTION 13

Here are three lines taken from the Java Order of Precedence chart. Which choice represents the correct order of precedence for these three lines?

I. << >> >>>
II. * / %
III. ? :

A. II, III, I B. III, II, I C. II, I, III
D. I, II, III E. I, III, II

QUESTION 14

Which of the following choices does NOT belong to the primitive integer data type family?

A. short B. long C. byte D. float E. int

QUESTION 15

What is output by the code to the right?

A. `[7, 5, -7, 0]` B. `[7, 5, -7, 0, 3]`

C. `[2, 3, 4, 5, 7]` D. `[2, 3, 4, 5]`

E. `[2, 7, 5, -7]`

```
ArrayList<Integer> list;
list = new ArrayList<Integer>();
list.add(4);list.add(2);list.add(7);
list.add(5);list.add(-7);list.add(0);
list.add(3);list.add(9);
Collections.sort(list);
out.println(list.subList(2,6));
```

QUESTION 16

How many ordered boolean pairs (00,01,10,11) make this boolean expression true?

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

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

QUESTION 17

What is output by the code to the right?

A. `54` B. `70` C. `36` D. `30` E. `84`

```
int [][] grid = new int[4][7];
for(int r=1;r<grid.length;r++)
 for(int c=0;c<grid[r].length;c++)
  grid[r][c] = (grid[r-1][c]+c)*2;
out.println(grid[3][6]);
```

QUESTION 18

The two's complement system is all about representing negative numbers in binary. For example, the positive value 72 in 8-bit binary is **01001000**. To find the binary representation for -72 using two's complement, you use this easy conversion process.

Start from the right and keep all zeroes the same until you reach the first 1 digit. Keep that 1 the same also, and flip everything else, with an 8-bit binary result of **10111000** for -72.

With that in mind, which of the following choices represents the 8-bit binary representation of -112?

A. `01001000` B. `10100100` C. `10011000` D. `01110000` E. `10010000`

QUESTION 19

What is output by the code to the right?

A. `128` B. `134` C. `127` D. `120`

E. There is no output due to an error.

```
String s = "";
for(int x=1;x<100;x*=2)
 for(int y=1;y<=x;y++)
   s+='*';
out.println(s.length());
```

QUESTION 20

After building a binary search tree from the characters of the string "NEWSCHOOLYEAR", how many nodes have two children? Remember that duplicate nodes are allowed, and any ties are resolved to the left.

A. 2 B. 6 C. 4 D. 3 E. 5

QUESTION 21

What is output by the code to the right?

A. `1.0` B. `0.5` C. `0.9` D. `1.7`

```
int angle = 60;
out.printf("%.1f\n",Math.cos(
           Math.toRadians(angle)));
```

QUESTION 22

What is output by the code to the right?

A. 3 5 1 3 4 6 7 2 0 8 9 5
B. 3 5 4 1 2 3 6 7 0 8 9 5
C. 3 5 4 0 1 2 3 6 7 8 9 5
D. 3 5 4 1 3 6 7 2 0 8 9 5
E. 3 5 1 2 3 4 6 7 0 8 9 5

```
int [] list =
{3,5,4,7,6,3,1,2,0,8,9,5};
Arrays.sort(list,3,8);
for(int x:list)
 out.print(x+" ");
out.println();
```

QUESTION 23

On the right is a partially complete code segment for the sequential search process, which searches through a list from left to right and provides the index value of the search key when it is found. Otherwise the answer provided is the value negative 1. Which choice below would best replace **<statement1>** and **<statement2>** to complete the method as described?

A. `return j;` `return -1;`
B. `out.println(key);` `out.println(0);`
C. `out.println(j);` `out.println(-1);`
D. `return j;` `return 0;`
E. `return key;` `return 0;`

```
public static int seqSearch(
           int[] elements, int key)
{
 for(int j=0; j<elements.length; j++)
    if (elements[j] == key)
      <statement1>
    <statement2>
}

////////////////////////////////
//client code

int [] list =
          {3,5,4,6,3,1,2,8,9,0,5};

out.print(seqSearch(list,8)+" ");
out.print(seqSearch(list,5)+" ");
out.println(seqSearch(list,7));
```

QUESTION 24

Assuming the method to the right works as described, regardless of the choice you selected in the previous question, what is output by the client code shown?

A. 7 1 -1 B. 8 11 0 C. 7 10 -1
D. 8 2 -1 E. 7 1 0

QUESTION 25

Which choice below best describes the string patterns listed as each replaces the **<pattern>** segment of the code segment to the right?

I. `"I[d-u]*.\\w*"`
II. `"I?.*e.+"`
III. `"A?\\D+.[d-u]*"`

A. III is true, I and II are false

B. I is true, II and III are false

C. II is true, I and III are false

D. All are true

E. All are false

```
String s = "IntelInside";
boolean p=
Pattern.matches(<pattern>,s);
out.println(p);
```

QUESTION 26

Infix notation is what is normally used in algebraic expressions, such as **3 + 5 * 6**, where the operators are between the operands. However, there is also prefix notation, where the operators are before the operands, such as **+ 3 * 5 6**, and postfix notation, operators after operands, like this: **3 5 6 * +**. Notice carefully that the operands never move around: only the operators change places.

Here is another example: the infix expression **6 * 7 + 9 - 8 * 2** translates the prefix expression **- + * 6 7 9 * 8 2**, and **6 7 * 9 + 8 2 * -** for postfix.

Given these examples to examine and study carefully, which of the prefix expressions below matches the infix expression shown?

5 - 2 * 5 + 6 * 3

A. **- + 5 * 2 5 * 6 3**
B. **+ - 5 * 2 5 * 6 3**
C. **- * + * 5 2 5 6 3**
D. *** 5 - + 2 5 * 6 3**
E. **- 5 + * 2 5 * 6 3**

QUESTION 27

What is output by the code to the right?

A. -14.0 B. -12.5 C. -6.5
D. -0.5 E. There is no output due to an error.

```
double d = 2.5;
int i1 = 3;
int i2 = -2;
d += i1*=i2-=3;
out.printf("%.1f",d);
```

QUESTION 28

Which of these is NOT a typical process found in a computer program?

A. iteration B. branching C. recursion D. input/output

E. All of these are typical programming processes.

QUESTION 29

What is output by the code below?

```
String [] words = {"Whose","woods","these","are","I","think","I","know",
                   "His","house","is","in","the","village","though",
                   "He","will","not","see","me","stopping","here",
                   "To","watch","his","woods","fill","up","with","snow"};

TreeMap<Integer,String> m = new TreeMap<Integer,String>();
for(String s:words)
 m.put(s.length(),s.toUpperCase());
out.print(m.size() + " ");
out.println(m.get(m.lastKey()));
```

A. 30 SNOW B. 28 WOODS C. 30 STOPPING D. 8 SNOW E. 8 STOPPING

QUESTION 30

What is output by the code to the right?

A. *inter*pring*ummer*all
B. ****
C. *Winter*Spring*Summer*Fall
D. *****
E. **inter*pring*ummer*all

```
String s;
s = "WinterSpringSummerFall";
String [] ar = s.split("\\p{Upper}");
for(String a:ar)
out.print("*"+a);
```

QUESTION 31

What is the output of the `//line 1` segment to the right?

A. `Movie@5df9aeda`
B. `R rated 90 minute thriller`
C. `rating rated minutes minute genre`
D. `R 90 thriller`
E. There is no output due to an error.

QUESTION 32

Which constructor or combination of constructors will be used by the compiler for this Movie object instantiation statement?

```
Movie m = new Movie("drama",100,'G');
```

I. Constructor 1
II. Constructor 2
III. Constructor 3

A. II, then III
B. II only
C. III only
D. I, then II, then III
E. I only

QUESTION 33

What is the output of the `//line 2` segment to the right?

A. `M rated 100 minute drama`
B. `M rated 90 minute thriller`
C. `G rated 100 minute drama`
D. `R rated 100 minute drama`
E. `R rated 90 minute thriller`

```
class Movie
{
 private String genre;
 private int minutes;
 private char rating;

 //constructor 1
 public Movie()
 {
    genre = "thriller";
    minutes = 90;
    rating = 'R';
 }

 //constructor 2
 public Movie(String t,int m, char r)
 {
    this(m,t);
    rating = 'M';
 }

 //constructor 3
 public Movie(int m, String t)
 {
    genre = t;
    minutes = m;
    rating = 'M';
 }

 public String toString()
 {
    return rating+" rated "+minutes
                 +" minute "+genre;
 }
}

//////////////////////////////
//client code

Movie m = new Movie();
out.println(m);   //line 1


Movie mm;
mm = new Movie("drama",100,'G');
out.println(mm);   //line 2
```

QUESTION 34

What is output by the code to the right?

A. `180` B. `29` C. `113`
D. `7` E. There is no output due to an error.

```
int n = 45;
String s = Integer.toString(n,6);
out.println(s);
```

QUESTION 35

On the right is a boolean expression using generic notation. Which of the expressions below represents the simplest form of this expression ?

$$\overline{\overline{AB}+C}$$

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

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

QUESTION 36

What is output by the code to the right?

A. `[2, 0, 6, 2, 4, 3]`
B. `[8, 2, 0, 6, 2, 4]`
C. `[2, 2]`
D. `[3, 5, 3]`
E. `[8, 3, 5, 0, 6, 4, 3]`

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

Queue<Integer> q;
q = new LinkedList<Integer>();

for(int n:list)
 if(n%2==0)
    q.add(n);
 else
 {
    q.add(n);
    q.poll();
 }
out.println(q);
```

QUESTION 37

Which of the logical statements shown below correctly represents the digital electronics diagram on the right?

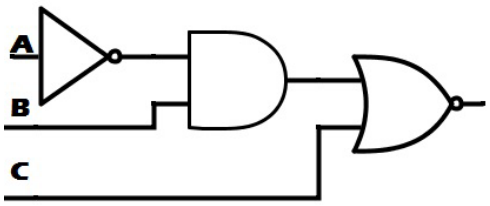
A. $\overline{\overline{A}B + C}$

B. $\overline{\overline{A} + BC}$

C. $\overline{\overline{AB} + C}$

D. $\overline{A} + BC$

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



QUESTION 38

Which choice below is NOT one of the outputs of the client code segment shown?

A. 9

B. 10

C. 4

D. 13

E. 5

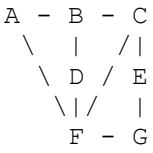
```
public static int mystNum(int x,
                          int y, int z)
{
 x=x+y/z;
 y=x+y/z;
 z=x+y/z;
 return x+y/z;
}


////////////////////////////////
//client code
int x=8,y=-4,z=-2;
out.println(mystNum(x,y,z));
x=10;y=5;z=-3;
out.println(mystNum(x,y,z));
x=12;y=-15;z=4;
out.println(mystNum(x,y,z));
x=-2;y=9;z=-2;
out.println(mystNum(x,y,z));
```

QUESTION 39

Free Response Question: In the graph pictured below, each letter is a vertex, or node, of the graph and the nodes are all connected by edges. The edges are just pathways between the nodes, with no specific direction indicated. A simple path would be one with no repeated nodes, such as ABDF, or EGFD. A cycle within the graph would be a simple path with only one repeated node, the first and the last, such as ABDFA, or EGFDBCE. Starting on a different node in the same cycle still counts as the same cycle, therefore DFABD is the same cycle. Also, for the purposes of this question, reversing the order still counts the same, such as DBAFD.

Given all of that information, how many DIFFERENT cycles are there in this graph? _____



QUESTION 40

Free Response Question: A certain elf can decorate a box of cookies, for a small fee, of course. The fee is based on the number of cookies to be decorated. When given a box containing fewer than 5 cookies, the elf charges $2.00 to decorate all the cookies in the box. However, if the box contains five or more cookies, the elf moves half the cookies into a new box and charges $1.00 for this service. Because the elf never breaks a cookie, one box might contain one more cookie than the other box. The boxes are then decorated in this same way.

If you give the elf a box containing 71 cookies with instructions to decorate all of the cookies, how much will it cost? _____