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

What is 23_6 minus 23_4

A. 1010_2 B. 23_2 C. 4_5 D. 0_2 E. 1010_3

QUESTION 2

What is output by the code to the right?

A. 4 B. 22 C. 7

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

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

```
int lol = 3;
int lo1 = 4;
out.println( lol + lo1 );
```

QUESTION 3

What is output by the code to the right?

A. `true` B. `false` C. 1 D. 0

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

```
out.println(true || false);
```

QUESTION 4

What is output by the code to the right?

A. `char` B. `mandermandercharmander`

C. `mander` D. `one`

E. `charcharmanderchar`

```
String two = "char";
String one = "mander";
String three = two+two+one+two;
out.println(one);
```

QUESTION 5

What is output by the code to the right?

A. 0 B. 0.0 C. 10 D. 18

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

```
byte[] Doubles = new byte[9];
short[] Integers = new short[9];
out.println(Doubles[8]+Integers[2]);
```

QUESTION 6

What is output by the code to the right?

A. 23 B. 24 C. 25 D. 22 E. 26

```
int ct = 1;
for(int i = -1;i <= 23;i++){
   ct++;
}
out.println(ct);
```

QUESTION 7

How many combinations of values for the `boolean` variables `j, k, a,` and `l` will result in `q` being set to `false`?

A. 6 B. 8 C. 5 D. 3 E. 10

```
boolean j, k, a, l;
//code to initialize j, k, a, and l
boolean q = (k || j) && !l || j;
out.println(q);
```

QUESTION 8

What is output by the code to the right?

A. `false` B. `true` C. `yo` D. `1` E. `0`

```
boolean[] ar = new boolean[10];
for(int i = 0;i < 10;i+=2)
  ar[i] = true;
out.println(ar[4] && ar[9]);
```

QUESTION 9

How many constructors and instance variables are in the class `School` ?

A. `5` B. `2` C. `3` D. `7` E. `4`

QUESTION 10

How many methods are in the class `School` ?

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

QUESTION 11

What is output by the following client code ?

```
out.println(new School("a", 3));
```

A. `new School("a", 3)`

B. `a3`

C. `3a`

D. `3.0a`

E. A memory address is output

```
public static class School{
  private int pop;
  private String nm;
  public School(String a, int b){
     pop = b;
     nm = a;
  }
  public void rename(String s){
     nm = s;
  }
  public float getPopulation(){
     return pop;
  }
}
```

QUESTION 12

What is output by the code to the right ?

A. `0` B. `2` C. `3` D. `4` E. `5`

```
int a = 5;
int b = 3;
out.println(a>>2+3&b);
```

QUESTION 13

What is output by the code to the right ?

A. `10` B. `20` C. `30` D. `40` E. `50`

```
int b = Math.max(10,20);
int a = Math.max(30,40);
out.println(Math.min(a,b));
```

QUESTION 14

What is output by the code to the right ?

A. `true` B. `false` C. `yes` D. `no`

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

```
String st = "biochemsics";
String ind = "chem";
out.println(st.startsWith(ind,3));
```

QUESTION 15

What replaces **<*1>** in the code to the right so that it compiles without error ?

A. `new List<Character>()`

B. `new List<>()`

C. `new ArrayList<Character>()`

D. `new ArrayList<>()`

E. more than one of these

Assume **<*1>** has been filled in correctly.

QUESTION 16

What is output by the code to the right ?

A. `55` B. `7` C. `E` D. `69` E. `0`

```
List<Character> numList = <*1>;
numList.add((char)48);
numList.add((char)101);
numList.add((char)48);
numList.add((char)62);
numList.add((char)0);
numList.remove(0);
out.println(numList.get(2)+7);
```

QUESTION 17

What is output by the code to the right ?

A. `077` B. `77` C. `119` D. `63`

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

```
out.printf("%d",077);
```

QUESTION 18

What is output by the code to the right ?

A. `15.0` B. `16.0` C. `2.0`

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

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

```
float u = 5.23f;
double r = 8.2;
int t = 7;
short h = 9;
out.println((float)(int)(h+t%(u+r)));
```

QUESTION 19

What is output by the code to the right ?

A. `-7` B. `7` C. `0` D. `-1` E. `-6`

```
String best = "math";
String worst = "mathematics";
out.println(best.compareTo(worst));
```

QUESTION 20

What replaces **<*1>** in the code to the right so that it compiles without error ?

A. `String`

B. `ArrayList`

C. `Character`

D. `Plays`

E. `Play`

Assume **<*1>** has been filled in correctly.

QUESTION 21

What is output by the first client code to the right ?

A. `ahz` B. `haz` C. `zah` D. `azh` E. `zha`

QUESTION 22

What is output by the second client code ?

A. `true` B. `false` C. `maybe`

D. Output cannot be determined until runtime.

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

```
public class <*1>
    implements Comparable < <*1> >
{
  private char[] plays;

  public Play(String s){
     plays = s.toCharArray();
  }

  public int howBigPlay(){
     int playSum = 0;
     for(int i=0;i<plays.length;i++){
        playSum += plays[i];
     }
     return playSum/plays.length;
  }

  public int compareTo(Play o){
     return o.howBig()-howBig();
  }

  public String toString(){
     return ""+plays[0];
  }
}

//client code 1
Play[] list = new Play[3];
list[0] = new Play("hue");
list[1] = new Play("aa");
list[2] = new Play("za");
Arrays.sort(list);
for(int i=0; i<list.length;i++)
  out.print(list[i]);

//client code 2
int sz = (int)(Math.random()*100+1);
Play[] list = new Play[sz];
for(int i=0;i<sz;i++)
  for(int j=0;j<3;j++){
     int rand =
            (int)(Math.random()*5+1);
     String a = "";
     for(int k=0;k<rand;k++){
        double d = Math.random()*25;
        int s = (int) (d + 97);
        a+=(char)s;
        list[i]= new Play(a);
     }
  }
Play[] list2 = list;
Arrays.sort(list);
out.println(list.equals(list2));
```

QUESTION 23

What is returned by the method call `ez("asdfe")`?

A. `efdsa` B. `fs` C. `sf` D. `asdfe`

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

QUESTION 24

What is returned by the method call `ez("asdfew")`?

A. `fewdsa` B. `asdfew` C. `wfs` D. `eda`

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

```
public static String ez(String s){
  if(s.length()==1)
     return "";
  String h = ez(s.substring(2));
  return h+s.charAt(1);
}
```

QUESTION 25

What is output by the code to the right ?

A. `1`

B. `1.0`

C. `0`

D. `0.0`

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

```
out.println(Math.log1p(Math.E-1));
```

QUESTION 26

What is output by the following client code ?

```
int[] a = {6, 2, 10, 9, 4, 15};
a = cheapSort(a, false);
String o = Arrays.toString(a);
out.println(o);
```

A. `[2, 4, 10, 9, 6, 15]`

B. `[2, 4, 6, 9, 10, 15]`

C. `[2, 6, 4, 9, 10, 15]`

D. `[15, 10, 6, 9, 4, 2]`

E. `[15, 10, 9, 6, 4, 2]`

QUESTION 27

What is output by the following client code ?

```
int[] a = {6, 2, 10, 9, 4, 15};
sortAnalysis(a);
```

A. `[2, 4, 10, 9, 6, 15]`

B. `[2, 4, 6, 9, 10, 15]`

C. `[2, 6, 4, 9, 10, 15]`

D. `[15, 10, 6, 9, 4, 2]`

E. `[15, 10, 9, 6, 4, 2]`

QUESTION 28

What kind of sort does the code to the right implement ?

A. radix sort B. insertion sort

C. selection sort D. merge sort

E. heap sort

```
public int[] cheapSort(int[] old,
                       boolean chk){
  int[] outp = new int[old.length];
  PriorityQueue<Integer> s;
  s = new PriorityQueue<>();
  for(int i=0;i<old.length;i++)
     s.add(old[i]);
  if(chk)
     out.println(s);
  int ct = 0;
  while(!s.isEmpty())
     outp[ct++] = s.poll();
  return outp;
}
public void sortAnalysis(int[] old){
  cheapSort(old,true);
}
```

QUESTION 29

What is output by the following client code ?

```
int[] d = {2, 3, 6};
out.println(myst(d,6));
```

A. 2 B. 6

C. 1 D. 3

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

QUESTION 30

What is output by the following client code ?

```
int[] d = {1, 5, 10, 25};
out.println(myst(d,212));
```

A. 9 B. 11

C. 4 D. 12

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

```
public int myst(int[] d, int f){
    int[] t = new int[f+1];
    int m = Integer.MAX_VALUE;
    Arrays.fill(t, m);
    t[0] = 0;
    for(int i=1;i<t.length;i++){
       int best = m;
       for(int j=0;j<d.length;j++){
          int n = i-d[j];
          if(n<0||t[n]==-1) continue;
          best = Math.min(best,
                                t[n])+1;
       }
       if(best==m)
          best=-1;
       t[i]=best;
    }
    return t[f];
}
```

QUESTION 31

What replaces **<*1>** in the code to the right so that it compiles without error ?

A. HashMap<>

B. TreeMap<>

C. LinkedHashMap<>

D. B & C only

E. A, B, & C

Assume **<*1>** has been filled in correctly.

QUESTION 32

What is output by the method call `s("OOoOOoOO",'O')`?

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

```
public int s(String s, char f){
    Map<Character, Integer> map;
    map = new <*1>();
    for(int i=0; i<s.length();i++){
       char c = s.charAt(i);
       if(map.get(c)==null)
          map.put(c, 1);
       else
          map.put(c, map.get(c)+1);
       if(c<94)
          map.put(c, map.get(c)+1);
    }
    return map.get(f);
}
```

QUESTION 33

What is output by the code to the right ?

A. -2 B. 2

C. 2147483647 D. 2147483646

E. -4

```
out.println(-2>>>2<<2);
```

QUESTION 34

Assume method `monster(int[] data)` is $O(N^5)$ where N = `data.length`. When method `monster` is passed an array with `length` = 2,596 it takes 2,048 seconds for method `monster` to complete. If method `monster` is then passed an array with `length` = 649 what is the expected time it will take method `monster` to complete?

A. 1 second B. 2 second C. 1028 seconds D. 2048 seconds E. 2,097,152 seconds

QUESTION 35

What is output by the code to the right ?

A. `It`

B. `s a trap.`

C. `It's a trap.`

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

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

```
public static void trap(){
    out.println("It's a trap.");
}
```

QUESTION 36

What is the postfix notation for the infix expression to the right ?

A. `BI+GPL-A^YS^/-=`

B. `GPLBI+-A^YS^/-=`

C. `BIG-+P^LAYS-/+=`

D. `GPLB-+IYA/+^S-=`

E. None of the above.

$$G = P - \frac{[L - (B + I)]^A}{Y^S}$$

QUESTION 37

What is the prefix notation for the infix expression to the right ?

A. `=-^/+^+BIGPLAYS`

B. `=G-P/^+L+BIA^YS`

C. `=G-P/^-L+IBA^YS`

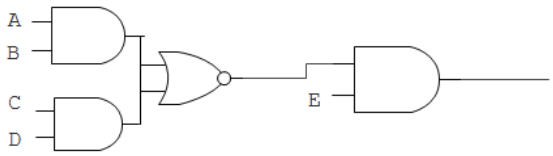
D. `=G-P/^-L+BIA^YS`

E. None of the above.

QUESTION 38

How many combinations of A, B, C, D, and E result in `true`?

A. `1` B. `2` C. `9` D. `12` E. `32`



QUESTION 39 *OPEN ENDED QUESTION – Find the answer and write it on your answer sheet. If you are using a ScanTron form, write the question number and the answer on the bottom of the ScanTron.* Simplify the boolean expression to the right to a single term.	$(X * (\bar{Y} + \bar{Z})) + (Z * Y * X)$
QUESTION 40 *OPEN ENDED QUESTION – Find the answer and write it on your answer sheet. If you are using a ScanTron form, write the question number and the answer on the bottom of the ScanTron.* What is the reverse in-order traversal of the tree to the right ?