Note: Correct responses are based on Java, J2sdk v 7.0, 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.

QUESTION 1

What is BIO_{25} plus CS_{29}

A. 3343_{10} B. 7245_{10} C. 7725_{10} D. 3340_{10} E. 3325_{10}

QUESTION 2

What is output by the code to the right?

A. `21` B. `-21` C. `63` D. `-021` E. `42`

```
int pow = 42;
int strength = 21;
out.println(strength - pow);
```

QUESTION 3

What is output by the code to the right?

A. `dlrow` B. `worldhello.`

C. `helloworld.` D. `hello.world`

E. `world.hello`

```
String hello = "hello";
String dlrow = "world";
dlrow += hello + ".";
out.println(dlrow);
```

QUESTION 4

What is output by the code to the right?

A. `35` B. `11` C. `21`

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

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

```
byte stuff = 23;
short other = 12;
out.println(other + stuff);
```

QUESTION 5

What is output by the code to the right?

A. `24` B. `25`

C. `5` D. `4`

E. `6`

```
int count = 1;
for(int i = 1;i < 24; i*=2)
    ++count;
out.println(count++);
```

QUESTION 6

What is output by the code to the right?

A. `3` B. `3.5` C. `2` D. `25` E. `2.5`

```
double[] ints = {2, 5, 1, 20, 12};
out.println( ints[1] / ints[0] );
```

QUESTION 7

How many combinations of values for the boolean variables, j, k, and l will result in s being set to true

A. `0` B. `6`

C. `2` D. `4`

E. `1`

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

QUESTION 8

What is output by the code to the right?

A. 252 B. 517

C. 275 D. 247

E. 270

```
int num = 247;
if(num / 2 > 200)
  num *= 2;
  if(num / 2 > 100)
  num += 5;
else if(num < 400)
num += 23;
out.println(num);
```

QUESTION 9

What replaces **<*1>** in the code to the right so that the constructor the class `Aloof` calls the default constructor of the class `Awkward`?

A. `Awkward.Awkward();`

B. `Awkward.this();`

C. `super();`

D. `this();`

E. `super.this();`

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

QUESTION 10

How many instance variables does the class `Awkward` have ?

A. 1 B. 4

C. 2 D. 5

E. 3

QUESTION 11

What is output by the following code ?

```
Awkward j = new Awkward();
j.nm("jarx");
Aloof w = new Aloof("wynd", true, 9001);
w.doSomethingCool();
j.doSomethingCool();
out.println(j + ", " + w);
```

A. Kid 1, Kid 1

B. jarx 9005, wynd

C. jarx 1, wynd 9005

D. jarx 1, wynd 9003

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

```
public class Awkward{
     protected String nm;
     private boolean veryAwkward;
     private int girlsAttracted;
     public Awkward(){
        nm = "Kid";
        veryAwkward = false;
        girlsAttracted = 0;
     }
     public Awkward(String a,
                    boolean c, int s){
        nm = a;
        veryAwkward = c;
        girlsAttracted = s;
     }
     public void nm(String ch){
        nm = ch;
     }
     public void doSomethingCool(){
        if(veryAwkward)
            girlsAttracted += 2;
        else
            girlsAttracted += 1;
     }
     public String toString(){
        return nm + " " +
               girlsAttracted;
     }
     public String toString;
}
public class Aloof extends Awkward{
     public Aloof(){
        <*1>
     }
     public Aloof(String a, boolean c,
                  int s){
        super(a, c, s);
     }
     public void nm(String ch){
        super.nm(ch+ch);
     }
     public String toString(){
        super.doSomethingCool();
        return super.toString();
     }
}
```

QUESTION 12

What is output by the code to the right?

A. `-10` B. `212`

C. `4096` D. `14`

E. `24`

```
System.out.println(2 ^ 12);
```

QUESTION 13

What is output by the code to the right?

A. `7a` B. `216` C. `8E`

D. There is not output due to a syntax error.

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

```
out.printf("%o\n".toUpperCase(),142);
```

QUESTION 14

What is returned by the method call `pl(5)`?

A. `15` B. `0`

C. `13` D. `5`

E. `14`

```
public static int pl(int de){
    int nl = de + 2;
    int gb = nl++;
    int b = nl + gb;
    return b;
}
```

QUESTION 15

What is output by //1 in the code to the right?

A. `0` B. `592` C. `1131` D. `1041` E. `1040`

QUESTION 16

What is output by //2 in the code to the right?

A. `50293` B. `879922`

C. `231125` D. `540280`

E. `89938`

```
int ct1 = 0;
int ct2 = 1;
for(int i=0;i<1040;i++)
{
    for(int j=i;j>0;j--)
    {
        ct1++;
    }
    ct2++;
}
System.out.println(ct2); //1
System.out.println(ct1); //2
```

QUESTION 17

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

A. `String` B. `Object`

C. `Long` D. `Boolean`

E. more than one of these

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

QUESTION 18

What is output by the code to the right?

A. `50000` B. `23` C. `17` D. `15` E. `55`

```
HashSet<<*1>> n;
n = new HashSet<<*1>>();
for(int i=0;i<50000;i++){
    int nPr = (int)(Math.random()*10);
    int nCr = (int)(Math.random()*5);
    n.add(nPr * nCr);
}
System.out.println(n.size());
```

QUESTION 19

What is output by the code to the right?

A. `25.0` B. `-25.0` C. `-23` D. `-23.0`

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

```
double java = Math.floor(76.9);
float pearl = 52.3;
out.println(Math.ceil(pearl) - java);
```

QUESTION 20

What is output by the code to the right?

A. `[4, 5, 9]`

B. `[4, 9, 0]`

C. `[9, 5, 4]`

D. `[9, 4, 5]`

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

```
ArrayList<Integer> list;
list = new ArrayList<Integer>();
list.add(new Integer(0));
list.add(5);
list.remove(0);
list.add(1,4);
list.add(1,new Integer(9));
Collections.rotate(list,-2);
System.out.println(list);
```

QUESTION 21

What is returned by the method call `m("","abc")`?

A. `abc1` B. `ba12` C. `ac21` D. `ab21`

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

QUESTION 22

What is returned by the method call `m("big","plays")`?

A. `bigplay7678` B. `bigyalp8789`

C. `play6576` D. `bigplay8789`

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

```
public static String m(
                    String a, String b)
{
    if(b.length() < 2)
        return a;
    String s = a + b.charAt(0);
    return m(s,b.substring(1)) +
          m(s,b.substring(2)).length();
}
```

QUESTION 23

What is output by the code to the right?

A. `8.82` B. `12.360`

C. `10.0` D. `8.0`

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

```
double od = 12.360;
double m = 45.9;
System.out.println(m % od);
```

QUESTION 24

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

A. `Object` B. `double`

C. `Double` D. `long`

E. more than one of these

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

```
<*1>[] comp;
comp = new <*1>[5];
int ct = 0;
comp[ct++] = Float.MAX_VALUE;
comp[ct++] = Double.MAX_VALUE;
comp[ct++] = Short.MAX_VALUE;
comp[ct++] = Byte.MAX_VALUE;
comp[ct++] = Long.MAX_VALUE;
ct = 0;
for(int i=0;i<comp.length;i++)
    for(int j=i+1;j<comp.length;j++){
        if(comp[i]<comp[j])
            ct++;
    }
System.out.println(ct);
```

QUESTION 25

What is output by the code to the right ?

A. `10` B. `7` C. `1` D. `3` E. `0`

QUESTION 26

What replaces **<*1>** in the code to the right so that the variable `m` is set to the mathematical mean of `l` and `h`? Ignore overflow issues.

A. `l / 2 + h / 2`

B. `(l + h) >>> 1`

C. `(h - 1) * 2`

D. `(l + h) / 2`

E. more than one of these

```
public int where(int[] list, int t){
     return itAt(2, t,
                 list.length-1, list);
}

private int itAt(int l, int f, int h,
                 int[] list){
    if(l>h)
        return -1;
    int m = <*1>;
    if(list[m]==f)
        return m;
    if(list[m]<f)
        return itAt(++m,f,h,list);
    else
        return itAt(l,f,--m,list);
}
```

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

QUESTION 27

What is returned by the following method call ?

```
where(new int[]{0,2,5,7,9,12,77},2);
```

A. `-1` B. `2` C. `1` D. `5` E. `3`

QUESTION 28

Which type of algorithm does the method `where` use ?

A. radix search

B. quantum search

C. hash search

D. binary search

E. linear search

QUESTION 29

Assume method `doWork(int[] data)` is $O(N^3)$ where N = `data.length`. When method `doWork` is passed an array with `length` = 2,220 it takes 3 seconds for method `doWork` to complete. If method `doWork` is then passed an array with `length` = 6,660 what is the expected time it will take method `doWork` to complete?

A. 27 seconds B. 81 seconds C. 9 seconds D. 256 seconds E. 16 seconds

QUESTION 30

What is output by the code to the right ?

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

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

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

```
HashSet<Short> h;
TreeSet<Short> t;
h = new HashSet<Short>();
t = new TreeSet<Short>();
for(short i=2;i<10;i*=3){
    h.add(i);
    t.add(i);
}
out.print(h.equals(t) + " " + h == t);
```

QUESTION 31

What is output by the code to the right ?

A. `0` B. `-5`

C. `2147483648` D. `2147483647`

E. `-1`

```
out.println(-5 >>> 32);
```

QUESTION 32

The height of a tree is the number of links from the root of the tree to the deepest leaf in the tree. The following values are inserted one at a time in the order shown into a min heap using the traditional insertion algorithm. What is the height of the resulting tree?

`5, 3, 2, 10, 9, 0`

A. `0` B. `1` C. `2` D. `3` E. `6`

QUESTION 33

What is output by the line marked by `//1` in the code to the right ?

A. `false false false`

B. `true true true`

C. `true false true`

D. `true true false`

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

QUESTION 34

What is output by the line marked by `//2` in the code to the right ?

A. `25` B. `50` C. `32` D. `42`

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

```
Stack<Integer> tp;
tp = new Stack<Integer>();
Stack<Integer> bp;
bp = new Stack<Integer>();
for(int i=0;i<25;i++)
    bp.push(i);
Stack<Integer> sp;
sp = new Stack<Integer>();
for(int i=0;i<34;i++){
    for(int j=0;j<bp.size();j++)
        sp.push(bp.pop());
    tp = sp;
    sp = bp;
    bp = tp;
}
boolean e1 = tp.isEmpty();
boolean e2 = bp.isEmpty();
boolean e3 = sp.isEmpty();
int o = sp.size()+tp.size()+bp.size();
out.println(e1+" "+e2+" "+e3);    //1
out.println(o);                   //2
```

QUESTION 35

What is output by `//1` in the code to the right ?

A. `1` B. `10` C. `11`

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

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

QUESTION 36

What is output by `//2` in the code to the right ?

A. `1` B. `10` C. `11`

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

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

```
int i=0;
int j=0;
int ct = 0;
int ct1 = 1;
for(;j<10;j++){
    ct++;
    for(;i<10;i++)
        ct1++;
}
System.out.println(ct);           //1
System.out.println(ct1);          //2
```

QUESTION 37

What is returned by the line marked `//1` in the client code to the right ?

A. `256` B. `65` C. `128` D. `32` E. `64`

QUESTION 38

How many times is the method `resize()` called in the following code ?

```
Structure s = new Structure();
for(int i=5;i>-1;i--)
    s.add(i);
```

A. `26` B. `16` C. `24` D. `64` E. `32`

QUESTION 39

What type of data structure does the `Structure` class implement ?

A. Queue
B. List
C. Tree
D. Stack
E. Hash table

```
public class Structure{
     Structure[] con;
     private int val;
     private int sz;
     public Structure(){
        this(1);
     }
     public Structure(int st){
        val = st;
        con = new Structure[1];
        sz = 0;
     }

     public void add(int val){
        for(int i=0;i<sz;i++)
           con[i].add(val);
        if(sz == con.length)
           resize();
        con[sz++]=new Structure(val);
     }

     private void resize(){
        int t = con.length*2;
        Structure[] tp;
        tp = new Structure[t];
        for(int i=0;i<con.length;i++)
           tp[i] = con[i];
        con = tp;
     }

     public int get(int val){
        int ct = 0;
        for(int i=0;i<sz;i++)
           ct += con[i].get(val);
        return val==this.val?ct+1:ct;
     }
}


////////////////////////////////////
//client code
Structure s = new Structure();
for(int i=7;i>-1;i--)
    s.add(i);
out.println(s.get(1));              //1
```

QUESTION 40

What is output by the code to the right?

A. `Should have read the whole test :\`
B. `I don't need your handouts!`
C. `Free 6 points :)`
D. There is no output due to a syntax error.
E. There is no output due to a runtime error.

```
String a = "Read the whole test!";
System.out.println("Free 6 points :)");
```