Note: Correct responses are based on Java, J2sdk v 6.0, 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 $11111_2 + 10001_2$?

A. 32 B. 44 C. 46 D. 48 E. 49

QUESTION 2

What is output by the code to the right?

A. 1 B. 2 C. 3 D. 13 E. 23

```
boolean b = true, d = false;
if( (!b || !d) && !(b && d) )
   System.out.print(1);
else
   System.out.print(2);
System.out.println(3);
```

QUESTION 3

What is output by the code to the right?

A. 12 B. 14 C. 15 D. 16

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

```
int so=1, re=2, mi=3, fa=4, du=5;
int ret = du + re + mi + fa + so;
System.out.println( ret );
```

QUESTION 4

What is output by the code to the right?

A. 36 B. 29 C. 27 D. 32 E. 30

```
int a = 13;
int b = 27;
int c = 8;
System.out.println( a^b^c );
```

QUESTION 5

What is output by the code to the right?

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

```
int sum = 0;
int i;
for(i=0;i<2;i++)
{
   sum += i++;
}
System.out.println( i + " " + sum );
```

QUESTION 6

What is output by the code to the right?

A. 0 B. -1 C. 1 D. 2

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

```
int[] arr = {0,0,0,1,0,1,0,0,0};
int j=0;

for(int i=0;i<arr.length;i++)
   j |= arr[i];

System.out.println(j);
```

QUESTION 7

What is output by the code to the right?

A. 2a B. 98 C. c D. 99

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

```
char c = 'a';
int i = 2;
System.out.println(c+i);
```

QUESTION 8

What is output by the code to the right?

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

```
int i, j, k;
i = j = 1;
k = 0;
System.out.println(i & j & k);
```

QUESTION 9

What is output by the code to the right?

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

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

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

```
String str = "a b c";
boolean g = str.trim() == str();
System.out.println(g);
```

QUESTION 10

What is output by the code to the right?

A. `5` B. `0` C. `50` D. `1`

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

```
int z = 5;
int p = 0;
System.out.println( z % p );
```

QUESTION 11

What is output by the code to the right?

A. `63` B. `64` C. `127` D. `128` E. `251`

```
int cout = 2;
int halloween = 5;
int endl = 1;

int cpp = cout << halloween << endl;
System.out.println( cpp );
```

QUESTION 12

Which of these is not a primitive type in Java?

A. `int` B. `long double` C. `Double` D. both A and B E. both B and C

QUESTION 13

What is output by the code to the right?

A. `D`

B. `E`

C. `F`

D. `G`

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

```
char c='0';
int sum=0;
double k=1.0;

for(int i = 0; i < 5; i++)
{
   for(int j = i-1; j >= 0; j--)
   {
      sum += j;
   }
   k += sum * (i+1);
}
c = (char)((int)k);
System.out.println(c);
```

QUESTION 14

What is output by the code to the right?

A. `1` B. `2` C. `3` D. `5` E. `19`

```
String s = "al4?ph1z..lag?sauce";
String[] arr = s.split("[\\d]\\?");
System.out.println(arr.length);
```

QUESTION 15

What is output by the code to the right?

A. 32 B. 32.0 C. 10 D. 7 E. 2.5

```
System.out.println(Math.pow(2,5));
```

QUESTION 16

What is output by the code to the right?

A. 4 B. 5 C. 6 D. 9 E. -1

```
String s1 = "Evil Peter";
String s2 = "Evil Professor Von Ahn";
System.out.println( s2.indexOf(s1) );
```

QUESTION 17

What is output by the code to the right?

A. 3 B. 4 C. -3 D. -4 E. -2

```
int count = 0;
String s = "deedeearr";
int n = s.length();
for(int i = 0; i < n; i++)
{
   if( s.charAt(i) –
      s.charAt((i+3)%n) < 0 )
      count++;
   else
      count--;
}
System.out.println(count);
```

QUESTION 18

What is output by the code to the right?

A. 321 B. 320 C. 312 D. 302 E. 310

```
ArrayList<Integer> list;
list = new ArrayList<Integer>();

list.add(3);
list.add(2);
list.add(1,0);

for(int i = 0; i < list.size(); i++)
   System.out.print(list.get(i));
```

QUESTION 19

What is output by the code to the right?

A. 10 B. 14 C. 17 D. 19 E. 20

```
Stack<Integer> s;
s = new Stack<Integer>();

for(int i = 5; i >= 0; i--)
   s.push(i);

while(s.size()>1)
{
   int sum = s.pop() + s.pop();

   if( sum % 3 == 1)
      continue;

   s.push( sum );
}
System.out.println(s.pop());
```

QUESTION 20

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

A. `true` B. `false` C. `True` D. `False` E. `T`

QUESTION 21

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

A. `true` B. `false` C. `True` D. `False` E. `T`

QUESTION 22

What is output by the line marked `//3` in the code to the right?

A. Prints out numbers 1 through 100
B. Prints out even numbers less than 100
C. Prints out odd numbers less than 100
D. Prints out all primes less than 100
E. Prints out all composites less than 100

```
boolean[] q = new boolean[100];
Arrays.fill(q,true);
q[0] = q[1] = false;
for(int i = 2; i < 100; i++)
{
   if(!q[i]) continue;
   for(int k = i+i; k < 100; k+=i)
      q[k] = false;
}

System.out.println(q[5]);      //1
System.out.println(q[49]);     //2
for(int i = 0; i < 100; i++)
{
   if(q[i])
      System.out.println(i);   //3
}
```

QUESTION 23

What is output by the code to the right?

A. `-3.2f`
B. `-1.251`
C. `-1.25`
D. `1.25`
E. There is no output due a syntax error.

```
System.out.printf("-3.2f", 1.251 );
```

QUESTION 24

What is returned by `spooky(5)` ?

A. 16 B. 17 C. 18 D. 19 E. 20

QUESTION 25

What is the runtime of method `spooky` ?

A. $O(n^3)$
B. $O(n)$
C. $O(n^2)$
D. $O(n \log n)$
E. $O(n^2 \log n)$

```
public int spooky(int n)
{
   int inc=0;
   for(int i = 0; i < n; i++)
   {
      for(int k = i+1; k < n; k+=2)
      {
         for(int j = 1; j < n; j*=2)
         {
            inc++;
         }
      }
   }
   return inc;
}
```

QUESTION 26

What is returned by `brute("abcdabcd")` ?

A. 1 B. 2 C. 3 D. 4 E. 8

QUESTION 27

What is returned by `brute("abababab")` ?

A. 1 B. 2 C. 3 D. 4 E. 8

QUESTION 28

What is returned by `magic("abcdabcd")`?

A. 1 B. 2 C. 3 D. 4 E. 8

QUESTION 29

What is returned by `magic("abababab")`?

A. 1
B. 2
C. 3
D. 4
E. 8

```
public int brute( String s )
{
   int len = s.length();
   for(int i = 1; i < len; i++)
   {
      if( len % i != 0 )
         continue;

      boolean good = true;
      String sub = s.substring(0,i);
      for(int k = i; k < len; k+=i)
      {
         String sub2 =
            s.substring(k,k+i);
         if(!sub.equals(sub2))
         {
            good = false;
            break;
         }
      }
      if( good ) return i;
   }
   return len;
}

public int magic( String s )
{
   String s2 = s.substring(1)+s;
   return s2.indexOf(s)+1;
}
```

QUESTION 30

What is returned by `rec(3)`?

A. 2 B. 3 C. 4 D. 5 E. 8

QUESTION 31

What is returned by `rec(8)`?

A. 8 B. 9 C. 10 D. 12 E. 14

```
public int rec( int x )
{
   if(x==0) return 1;
   int s=0;

   for(int i = 0; i < x; i++)
   {
      s+=rec(i/2);
   }

   return s;
}
```

QUESTION 32

What is returned by `mathMagic(3, 3)` ?

A. `3`
B. `27`
C. `6`
D. `81`
E. `9`

QUESTION 33

What is returned by `mathMagic(2, 11)` ?

A. `128`
B. `256`
C. `1024`
D. `2048`
E. `4096`

QUESTION 34

What is the runtime of method `mathMagic` assuming all numerical operators have constant running time?

A. `O(nk)`
B. `O(n^k)`
C. `O(n log k)`
D. `O(log n)`
E. `O(log k)`

```
public int mathMagic( int n, int k )
{
   int res = 1;
   int base = n;
   while( k > 0 )
   {
       if( k % 2 == 1 )
          res *= base;

       base = base * base;
       k/=2;
   }
   return res;
}
```

QUESTION 35

What replaces **`<*1>`** and **`<*2>`** respectively in the code to the right?

A. `Double` and `Double`
B. `Float` and `Integer`
C. `Double` and `Integer`
D. Both B and C
E. All of the above

```
TreeMap<<*1>,<*2>> map;
map = new TreeMap<<*1>,<*2>>();
map.put(0.5f, 2);
```

QUESTION 36

What is output by the code to the right?

A. `8`
B. `9`
C. `10`
D. `14`
E. `15`

```
int[] nums = {1,2,3,4,5,6,7,8};
for(int i = 0; i < nums.length; i++)
   nums[i] = nums[nums.length-i-1];

System.out.println(nums[1]+nums[7]);
```

QUESTION 37

What should replace **<*1>** in the code to the right?

A. `Runnable`
B. `Nodeble`
C. `Queueble`
D. `Comparable`
E. `Comparator`

QUESTION 38

Assuming that **<*1>** is filled correctly, what should replace **<*2>** in the code to the right to insert `n` into the priority queue?

A. `insert`
B. `give`
C. `poll`
D. `push`
E. `offer`

QUESTION 39

What is the value of `tree1.freq`?

A. 1
B. 2
C. 3
D. 5
E. 6

QUESTION 40

What is the height of the binary tree represented by `tree2` (Assuming a binary tree that comprises of only the root has a height of 1) ?

A. 3
B. 4
C. 5
D. 6
E. 7

```
public class Node implements
                          <*1> <Node>
{
   char c;
   int freq;
   Node left, right;
   public Node(char c, int freq){
      this.c=c;
      this.freq=freq;
   }
   public int compareTo(Node b){
      return freq-b.freq;
   }
   public static Node Puff
      (char[] arr, int[] f){

      PriorityQueue<Node> pq =
        new PriorityQueue<Node>();

      for(int i=0;i<arr.length;i++)
            pq.<*2>(new Node(arr[i],
                        f[i]));

      while(pq.size()>1)
      {
         Node h1 = pq.poll();
         Node h2 = pq.poll();
         Node n = new Node('\0',
            h1.freq+h2.freq);
         n.left = h1;
         n.right = h2;
         pq.<*2>(n);
      }
      Node root = pq.poll();
      return root;
   }
}


//Client Code
char[] arr = {'a','b','c'};
char[] arr2 = new char[26];
int[] f = {2,1,3}, f2 = new int[26];

Arrays.fill(f2,1);
for(int i=0;i<26;i++)
   arr2[i] = (char)('a'+i);

Node tree1 = Node.Puff(arr, f);
Node tree2 = Node.Puff(arr2, f2);
```