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 the sum of 10101_2 and 10101_2 ?

A. 43_{10} B. 1120_3 C. 101011_2 D. 41_{10} E. 111_6

QUESTION 2

What is output by the code to the right?

A. 6 B. 9

C. 11 D. 8

E. 7

```
int a = 5;
int b = 3;
b += a++;
b += ++a;
b += a--;
System.out.println( a );
```

QUESTION 3

What is output by the code to the right?

A. 7.0 B. 10.0

C. 6.0 D. 8.0

E. There is no output due to a loss of precision error.

```
long c = 2;
float d = 1;
d = c + d + d + c;
System.out.println( d );
```

QUESTION 4

What is output by the code to the right?

A. 0 B. 14

C. 1 D. 16

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

```
String d = "ghostsandgoblins";
int cnt = d.length();
d.replaceAll( "g", "");
cnt = cnt  - d.length();
System.out.print( cnt );
```

QUESTION 5

What is output by the code to the right?

A. 0 B. 33

C. 32 D. 35

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

```
Integer[] array = {3,6,9,5,8,2};
Integer sum = 0;
for( Integer it : array )
  sum = sum + it;
System.out.println( sum );
```

QUESTION 6

What is output by the code to the right?

A. 0.0 B. 0.5

C. 2.0 D. 1.0

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

```
int e = 3;
double f = 21.5;
System.out.print( Math.ceil(f%e) );
```

QUESTION 7

What is output by the code to the right?

A. true true B. false false

C. true false D. false true

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

```
boolean g = false;
boolean h = !g;
System.out.print( (!g && !h) + " " );
System.out.print( !(h ^ g) );
```

QUESTION 8

What is output by the code to the right?

A. `12`
B. `23`
C. `13`
D. `24`
E. There is no output due to a syntax error.

```
Float j = 25.0f;
Double k = 25.0;
if( j.compareTo(k) == 0 )
  System.out.print("1");
else
  System.out.println("2");
System.out.print("3");
```

QUESTION 9

Which of the following could replace **<*1>** in the `abstract Beast` class at right?

A. `private abstract String eat();`
B. `public static final int herdSize = 90;`
C. `public static final byte maxRGB = 255;`
D. A and B only
E. A, B, and C

QUESTION 10

Assuming that **<*1>** is filled correctly, which of the following could fill blank **<*2>** in the client code at right?

A. `System.out.println( it.howMean() );`
B. `System.out.println( Beast.maxRGB );`
C. `System.out.println( it.eat() );`
D. A and B only
E. A, B, and C

```
public abstract class Beast
{
  <*1>
  public abstract double howMean();
}

public class Witch extends Beast
{
   private String name;
   private double tood;

   public Witch(String n, double t)
   {
      name = n;
      tood = t;
   }

   //other method / constructor
   //implementations not shown

}

//////////////////////////////////////////
//client code
Beast it = new Witch("potter", 99f);
<*2>
```

QUESTION 11

What is output by the code to the right?

A. `3`
B. `8`
C. `-3`
D. `7`
E. There is no output due to a runtime error.

```
ArrayList<Integer> stuff;
stuff = new ArrayList<Integer>();
stuff.add(3);
stuff.add(5);
stuff.add(7);
Collections.rotate(stuff,2);
stuff.add(4);
stuff.add(6);
stuff.add(8);
Collections.rotate(stuff,-2);
stuff.add(-1);
stuff.add(-2);
stuff.add(-3);
Collections.rotate(stuff,2);
stuff.remove(new Integer(6));
stuff.remove(0);
System.out.println(stuff.get(0));
```

QUESTION 12

What is output by the code to the right?

A. `false`
B. `true`
C. `0`
D. `1`
E. There is no output due to a syntax error.

```
int a = Integer.MIN_VALUE;
a--;
System.out.print(a == Integer.MAX_VALUE);
```

QUESTION 13

What is output by the code to the right?

A. `ghosts`
B. `\ghosts\`
C. `\gho\sts\`
D. `\\gho\\sts\\`
E. There is no output due to a runtime error.

```
System.out.println("\\gho\\sts\\");
```

QUESTION 14

What is output by the code to the right?

A. `(00.95)`
B. `(-00.95)`
C. `-000.95`
D. `-(00.95)`
E. There is no output due to a runtime error.

```
System.out.printf("%(07.2f", -.95);
```

QUESTION 15

What is the output by the code to the right ?

A. `11`
B. `4`
C. `-19`
D. `17`
E. `-9`

```
boolean[] boo = new boolean[25];
for(int i=0; i<boo.length; i++) {
  int j = boo.length-1;
  do{
    boo[j] = !boo[j];
  }while(boo[j] && --j>=0);
}
int c = boo.length / 2;
for(int i=0; i<boo.length; i++) {
  c = boo[i] ? c - 1 : c + 1;
}
System.out.println(c);
```

QUESTION 16

What is returned by the method call `goofy(15)`?

A. `45.0`
B. `22.5`
C. `15.0`
D. `22.0`
E. There is no output due to a syntax error.

```
public static double goofy(int x){
  x = x * 3;
  x /= 2;
  return x;
}
```

QUESTION 17

Given the adjacency matrix shown below, how many nodes must be visited to determine if a path exists from A to F, including the starting and ending nodes?

	A	B	C	D	E	F
A	0	1	0	0	0	0
B	1	0	1	0	0	0
C	0	1	0	0	1	0
D	0	0	0	0	1	0
E	0	0	1	1	0	1
F	0	0	0	0	1	0

A. 10 B. 3 C. 5 D. 7 E. 8

QUESTION 18

Given the following measurements, what is the most likely running time for method `sample(int[] data)` where N is equal to data.length? Choose the most restrictive correct answer.

Value of N	Time for method sample to complete
2,000	1.1 second
4,000	1.2 seconds
8,000	1.3 seconds

A. O(N) B. O(NlogN) C. $O(N^2)$ D. O(1) E. $O(N^{3/2})$

QUESTION 19

Which of the following can replace <*1> in the code to the right so that the code segment compiles without error?

I. `"99"`
II. `'a'`
III. `127`

A. I only

B. II only

C. III only

D. I and II only

E. I and III only

```
List<Byte> bits;
bits = new ArrayList<Byte>();
bits.add( new Byte(  <*1>  ) );
```

QUESTION 20

What is the output by the code to the right?

A. 5

B. 6

C. 6ansions

D. 5ansions

E. 5onstersroa

```
String line = "manymonstersroammansions";
String[] c = line.split("m");
System.out.print( c.length );
System.out.println( c[4] );
```

QUESTION 21

What is returned by `funny(4)` ?

A. `45` B. `28`

C. `136` D. `15`

E. `21`

QUESTION 22

What is returned by `funny(15)`?

A. `45` B. `28`

C. `136` D. `15`

E. `21`

```
public static int funny(int n)
{
  int ans = 0;
  for(int a = 0; a <= n; a++)
     for(int b = 0; b <= n; b++)
        for(int c=0; c <= n; c++)
        {
           if( a + b + c == n )
              ans++;
        }

  return ans;
}
```

QUESTION 23

Which of the following is true of a complete tree?

A. It is almost a full tree.

B. Every level except the last one is completely filled with nodes.

C. All nodes in the tree are in sorted order.

D. A and B only

E. A, B, and C

QUESTION 24

What is the output by the code to the right?

A. `40` B. `3567`

C. `3037` D. `337`

E. `3307`

```
System.out.println("3" + 5 * 6 + 7 );
```

QUESTION 25

What is the output by the code to the right?

A. `11`

B. `9`

C. `0`

D. `14`

E. `6`

```
int count = 0;
for(int i = 0; i < 7; i++){
  for(int j = i; j >= 0; j=j-2){
     if( (i * j) % 2 == 0)
        continue;
     count++;
  }
}
System.out.println(count);
```

QUESTION 26

Using the classes at right, which of the following would correctly define a reference variable named `it` and refer `it` to an appropriate object with a value of `7` ?

A. `Dog it = new Dog();`
B. `Dog it = new Animal(7);`
C. `Dog it = Dog().set(7);`
D. `Animal it = new Dog(7);`
E. `Animal it = new Dog();`

QUESTION 27

Assume `thang` has been defined as a reference to a `Dog` and referred to an appropriate `Dog` object. What will the following statements print?

```
thang.setUp(5);
out.println( thang.get() );
```

A. `5` B. `3`
C. `12` D. `10`
E. `6`

QUESTION 28

Assume `thang` has been defined as a reference to a `Dog` and referred to an appropriate `Dog` object. What will the following statements print?

```
thang.setDown(8);
out.println( thang.getX() );
```

A. `4` B. `3`
C. `10` D. `8`
E. `6`

```
public class Animal
{
  private int num;

  public Animal() {
    num = 3;
  }

  public int getX(){
    return get();
  }

  public void set(int x){
    num = x;
  }

  private int get(){
   return num;
  }
}

public class Dog extends Animal
{
  private int num;

  public Dog( int n ) {
   num = n;
  }

  public int getX(){
    return super.getX();
  }

  public void setUp(int x){
   num = x * 2;
  }

  public void setDown(int x){
   num = x  / 2;
  }

  public int get(){
   return num;
  }
}
```

QUESTION 29

What is output by the code at right?

A. `abcd`

B. `ceff`

C. `cbfa`

D. `cafe`

E. `cbff`

```
System.out.println(
            Long.toHexString(0x101L + 0xcafe));
```

QUESTION 30

What is output by the code at right?

A. `-2.0`

B. `0.0`

C. `65535.0`

D. `65534.0`

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

```
System.out.println((float)(long)(char)-2);
```

QUESTION 31

What is output by the code at right?

A. `27`

B. `52`

C. `25`

D. `77`

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

```
int a = 52;
int b = 25;
a ^= b ^= a;
System.out.println( a );
```

QUESTION 32

What is returned by the method call `fancy(32)`?

A. `15`

B. `14`

C. `13`

D. `10`

E. `12`

QUESTION 33

What is returned by the method call `fancy(40)`?

A. `15`

B. `14`

C. `13`

D. `10`

E. `12`

```
public static long fancy(int n)
{
   long ans = 0;
   if( n <= 2 )
      ans = -1;
   else
      ans = fancy(n - 1) + n >> 2;
   return ans;
}
```

QUESTION 34

After executing the client code below, which row would display the most numbers when `la` is printed on the screen?

```
GoblinLand la = new GoblinLand(5);
for( int item : new
     int[]{2,3,4,5,6,7,3,4,1,2,4,5,6,7} )
la.add( item );
System.out.println( la );
```

A. 2

B. 4

C. 3

D. 0

E. 1

QUESTION 35

What data structure is being represented by class `GoblinLand`?

A. A Heap

B. A Hash Table

C. A Binary Tree

D. A Graph

E. A Rusty Map

```
public class GoblinLand
{
 private int[][] g;

 public GoblinLand( int x )
 {
    g = new int[x][0];
    for( int i=0; i<g.length; i++)
    {
        g[i] = new int[x * 2];
    }
 }


   //pre :: num > 0
 public void add( int num )
 {
   int i = num % g.length, x = 0;

   while( x < g[i].length && g[i][x] != 0)
      x++;

   if( x == g[i].length  )
   {
      int[] r = new int[x * 2];
      System.arraycopy(g[i], 0, r, 0, x);
      g[i] = r;
   }

   g[i][x] = num;
 }


 public String toString()
 {
    String s = "";
    for( int[] r : g)
    {
      for( int v : r )
      {
        if( v != 0 )
           s += v + " ";
      }
      s += "\n";
    }
    return s;
 }
}
```

QUESTION 36

What replaces **<*1>** such that `f` returns 1 for `x=0` and `x=1`?

A. `x == 0 || x == 1`

B. `x >= 0 & x <= 1`

C. `(x >>> 1) == 0`

D. both A and B

E. A, B, and C only

QUESTION 37

Assuming that **<*1>** is filled correctly, what is output by the following client code?

```
new Fab(10);
```

A. 5

B. 23

C. 57

D. 89

E. 123

QUESTION 38

What is the Big O runtime of `new Fab(n)`?

A. O(N)

B. O(NlogN)

C. $O(N^2)$

D. $O(2^N)$

E. O(N!)

```
public class Fab
{
  private HashMap<Integer, Integer> s;

  public Fab(int x)
  {
    s = new HashMap<Integer, Integer>();
    out.println( f(x) );
  }

  public int f(int x)
  {
    if( <*1> ) {
      return 1;
    }
    if(s.get(x) != null) {
      return s.get(x);
    }
    int res = f(x-1) + f(x-2);
    s.put(x, res);
    return res;
  }
}
```

QUESTION 39

What is returned by the call `angry(1)`?

A. 0 B. 1

C. 2 D. 3

E. 4

QUESTION 40

What is the final value of variable `a` after the call `angry(0)` ?

A. 0 B. 1

C. 2 D. 3

E. 4

```
public int angry( int y )
{
  int a = 0;
  try
  {
    int x = 5 / y;
    a++;
  }
  catch(Exception e)
  {
    return a;
  }
  finally
  {
    a++;
  }
  return ++a;
}
```