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 CAD_{16} minus 11110001_2 ?

A. $D9E_{16}$ B. BCC_{16} C. $1CC_{16}$ D. BBC_{16} E. $B19_{16}$

QUESTION 2

What is output by the code to the right?

A. 7.5 B. 10 C. 12 D. 15 E. 7

```
int high = 10;
int low = 5;
int mid = high + low / 2;
System.out.println( mid );
```

QUESTION 3

What is output by the code to the right?

A. 4.0 B. 4.5 C. 3.0 D. 7.0 E. 3.5

```
double amt = 0.0;
for(int i = 4; i < 11; i++){
  amt += 0.5;
}
System.out.print( amt );
```

QUESTION 4

What is output by the code to the right?

A. 8 B. 1 C. 3 D. 7 E. -1

```
String dna = "aggtggacgg";
String sr = "cgg";
System.out.println(dna.indexOf(sr));
```

QUESTION 5

What is output by the code to the right?

A. true B. 0 C. null

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

E. There is no output due to a NullPointerException.

```
String[] names = new String[5];
System.out.println( names[1] );
```

QUESTION 6

What is output by the code to the right?

A. -7 B. 2 C. 0 D. 1 E. -1

```
int r = 29;
int s = 8;
int t = 3;
System.out.print( r % s % t );
```

QUESTION 7

What is output by the code to the right?

A. false true

B. true true

C. true false

D. truefalse falsefalse

E. false false

```
boolean p = true;
boolean q = 5.5 > 5;
System.out.print( p && !p );
System.out.print( " " );
System.out.print( !q || q );
```

QUESTION 8

What is output by the code to the right?

A. 123 B. 2 C. 3 D. 23 E. 1

```
String ex = "!!**!!";
char cx = ex.charAt(0);
if(Character.isUpperCase(cx))
  System.out.print( 1 );
if( Character.isDigit(ex.charAt(3)) )
  System.out.print( 2 );
if( ex.charAt(0) == ex.charAt(4) )
  System.out.print( 3 );
```

QUESTION 9

Which of the following correctly replaces **<*1>** in the code to the right? The code segment with the parameter `np` is a constructor for the `Book` class that can be accessed in all other classes.

A. `Book`

B. `public Book`

C. `private Book`

D. `public static Book`

E. `public void Book`

QUESTION 10

What is output by the client code to the right?

A. `12`

B. `10`

C. `14`

D. `2`

E. `0`

```
public class Book{

  private int numPages;

  <*1> (int np){
    numPages = np;
  }

  public void addPage(){
    numPages++;
  }

  public int getLen(){
    return numPages;
  }
}


////////////////////////////////////
/////// client code
Book draft = new Book(10);
Book other = draft;
other.addPage();
draft.addPage();
System.out.print( draft.getLen() );
```

QUESTION 11

What is output by the code to the right?

A. `5` B. `-6` C. `625` D. `-5` E. `false`

```
int m = 5;
m = ~m;
m = ~m;
System.out.print( m );
```

QUESTION 12

What is output by the code to the right?

A. `0.0` B. `1.0` C. `-2.0` D. `-1.5` E. `-1.0`

```
double a2 = -1.5;
System.out.print( Math.floor(a2) );
```

QUESTION 13

How many lines of output does the code to the right produce?

A. 3 B. 1 C. 2 D. 5 E. 4

```
String name = "Bob\nGibson";
System.out.println( name + name );
```

QUESTION 14

What is output by the code to the right?

A. `+-012` B. `+-12` C. `012` D. `-12` E. `+12-24`

```
System.out.printf("%0+3d", (12-24));
```

QUESTION 15

What is returned by the method call `manip(3, 2)`?

A. `9` B. `4` C. `6` D. `5` E. `0`

```
public int manip(int x, int y){
  y = x;
  x = y;
  return x * y;
}
```

QUESTION 16

How many distinct possible outputs are there for the code to the right?

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

```
int x, y, z;
// code to initialize x, y, and z

String result = "";
if ( x > 10 )
  result += "a";
if( y > 10 )
  result += "a";
if( z > 10 )
  result += "a";
else
  result += "b";
System.out.println(result.length());
```

QUESTION 17

What is output by the following client code?

```
School s1 = new School(100);
System.out.print( s1.stu() );
```

A. `1000` B. `0` C. `UIL` D. `ACSL` E. `100`

QUESTION 18

What is output by the following client code?

```
PrivateSchool p1 = new PrivateSchool();
System.out.println( p1.stu() );
```

A. `1000` B. `100` C. `0`
D. There is no output due to a syntax error in the client code.
E. There is no output due to a `ClassCastException`.

QUESTION 19

What is output by the following client code?

```
School s2 = new PrivateSchool();
System.out.println( s2.contest() );
```

A. `ACSL` B. `UIL` C. `null`
D. There is no output due to a syntax error in the client code.
E. There is no output due to a runtime error.

```
public class School{

  private int numStu;

  public School(){ this(1000); }

  public School(int numStu){
    this.numStu = numStu;
  }

  public int stu(){ return numStu; }

  public String contest(){
    return "UIL";
  }
}

public class PrivateSchool
                        extends School{

  public String contest(){
    return "ACSL";
  }
}
```

QUESTION 20

Which of the following is a valid Java identifier?

A. `Score12`
B. `12score`
C. `**score`
D. `score*times`
E. None of these are valid identifiers.

QUESTION 21

How many `*`'s are output by the code to the right?

A. `100` B. `81` C. `10` D. `9` E. `90`

```
for(int i = 1; i <= 10; i++)
  for(int j = 1; j < 10; j++)
    System.out.print('*');
```

QUESTION 22

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

A. `120` B. `2` C. `5` D. `7` E. `121`

```
public int process(int n){
  int result = 0;
  if( n <= 0 )
    result = 2;
  else
    result = 1 + process(n-1);
  return result;
}
```

QUESTION 23

What is output by the following client code?

```
Picture p2 = new Picture(100, 200);
System.out.print( p2.isPortrait() );
```

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

D. There is no output due to a syntax error in the client code.

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

QUESTION 24

What is output by the following client code?

```
Picture p3 = new Picture(100, 100);
Picture p4 = new Picture(100, 100);
System.out.print( p3 == p4 );
```

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

D. There is no output due to a syntax error in the client code.

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

```
public class Picture{
  private int width;
  private int height;

  public Picture(int w, int h){
    height = h;
    width = w;
  }

  public boolean isPortrait(){
    return height > width;
  }
}
```

QUESTION 25

What is output by the code to the right?

A. `true` B. `false` C. `truefalse`

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

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

```
int x = 3;
double a = 3;
double b = 4;
boolean res = (x == a) && !(a > b);
System.out.print( res );
```

QUESTION 26

What is output by the code to the right?

A. `0` B. `3` C. `4` D. `2` E. `6`

```
int[] data = {3, 1, 4, 1, 5, 9};
int tally = 0;
for(int i : data)
  if( i > data[0] )
    tally++;
System.out.print(tally);
```

QUESTION 27

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

A. `hB` B. `hc` C. `ch` D. `Blelmoch` E. `Bh`

QUESTION 28

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

A. `e` B. `h` C. `l` D. `m` E. `o`

```
ArrayList<Character> h;
h = new ArrayList<Character>();
String n = "Blelmoch";

for(int i = 0; i < n.length(); i++)
  h.add(0, n.charAt(i) );

String one = "" + h.get(0) +
                  h.get(h.size() - 1);
System.out.print( one );     //line 1
char ch = h.get(h.size()/2);
System.out.print(ch);        //line 2
```

QUESTION 29

Which of the following statements regarding Java keywords are true?

I. They cannot be used as identifiers in Java programs.
II. All keywords are primitive data types.
III. Keywords only contain upper case.

A. I only B. II only C. III only D. I and II only E. II and III only

QUESTION 30

What is output by the code to the right?

A. `2.0` B. `2.5` C. `2` D. `3.5` E. `3.0`

```
double c = 1.5;
c++;
System.out.print( c );
```

QUESTION 31

What must be the data type of the parameter `vals` be so that the elements of the `Collection` are always printed in sorted order?

A. `TreeSet` B. `HashSet` C. `ArrayList`
D. a native array E. `LinkedList`

```
public <T> void showAll
                  (Collection<T> vals){
  for(T obj : vals)
    System.out.println( obj );
}
```

QUESTION 32

Assume the method `process(int[] data)` is $O(N^3)$ where N = `data.length`. When the method `process` is passed an array with `length` = 10,000 it takes 8 seconds for method `process` to complete. If method `process` is then passed an array with `length` = 15,000 what is the expected time it will take method `process` to complete?

A. 64 seconds B. 32 seconds C. 100 seconds D. 27 seconds E. 256 seconds

QUESTION 33

Which answer is logically equivalent to the following Boolean expression? `p` and `q` are `boolean` variables.

```
p || q || !p
```

A. `false` B. `p && q && !p` C. `!p || !q || !p` D. `true` E. `!(p && !q && p)`

QUESTION 34

Consider the following statement from method `f` to the right.

```
c2 = f(s, t1) + 1;
```

Which of the following best describes the programming feature the statement uses?

A. method overloading
B. inheritance
C. Java generics
D. recursion
E. method overriding

QUESTION 35

What is returned by the method call `f("two", "two")`?

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

QUESTION 36

What is returned by the method call `f("sit", "kin")`?

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

```
public int f(String s, String t){
  if( s.length() == 0 )
    return t.length();
  else if( t.length() == 0 )
    return s.length();
  else{
    char sc = s.charAt(s.length()-1);
    char tc = t.charAt(t.length()-1);
    String s1, t1;
    s1 = s.substring(0,s.length()-1);
    t1 = t.substring(0,t.length()-1);
    int c1, c2, c3;
    if( sc == tc )
      c1 = f(s1, t1);
    else
      c1 = f(s1, t1) + 1;
    c2 = f(s, t1) + 1;
    c3 = f(t1, s) + 1;
    c2 = Math.min(c1, c2);
    return Math.min(c2, c3);
  }
}
```

QUESTION 37

What is output by the following client code?

```
String[] list = {"K", "B", "A", "B"};
sort(list);
System.out.print( Arrays.toString(list) );
```

A. `[K, B, B, A]` B. `[A, B, B, K]`

C. `[A, B, K]` D. `[K, B, A]`

E. LinkedList

QUESTION 38

Which sorting algorithm does method `sort` implement?

A. insertion

B. merge

C. quicksort

D. bubble

E. selection

```
public void sort(String[] d){
  final int lim = d.length;
  for(int i = 0; i < lim - 1; i++){
    int m = i;
    for(int j = i; j < lim; j++)
      if(d[j].compareTo(d[m]) > 0 )
        m = j;
    String temp = d[i];
    d[i] = d[m];
    d[m] = temp;
  }
}
```

QUESTION 39

Consider the `Structure` class to the right. What is output by the following client code?

```
Structure s = new Structure();
s = s.add(5);
s = s.add(3);
s = s.add(5);
s = s.add(1);
while( !s.isEmpty() ){
  System.out.print( s.get() );
  s = s.remove();
}
```

A. `1535` B. `5351` C. `135` D. `531` E. `1355`

QUESTION 40

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

A. an array based list

B. a hash table

C. a set

D. a stack

E. a queue

```
public class Structure{

  private static final Object END =
                              new Object();

  private Object data;
  private Structure rest;

  public Structure(){
    data = END;
  }

  public Structure add(Object obj){
    Structure result = new Structure();
    result.rest = this;
    result.data = obj;
    return result;
  }

  public Structure remove(){
    return rest;
  }

  public Object get(){
    return data;
  }

  public boolean isEmpty(){
    return data == END;
  }
}
```