

QUESTION 1

What is the sum of BA_{16} and AB_{16} ?

- A. 156_{16} B. CC_{16} C. FF_{16} D. 266_{16} E. 165_{16}

QUESTION 2

What is output by the code to the right?

- A. 38.5 B. 70 C. 40
D. 20 E. 38

```
int x = 3;
int y = x + 2 * 4;
int z = y * x + y / 2;
System.out.print( z );
```

QUESTION 3

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

- A. 11 B. 12 C. 10
D. 13 E. 22

```
int limit = 11;
for(int count = 0; count <= limit; count++)
    System.out.print( "*" );
```

QUESTION 4

What is output by the code to the right?

- A. 1020 B. 1525 C. 105
D. There is no output due to a syntax error in the code.
E. There is no output due to a runtime error.

```
int[] list = new int[5];
for(int i = 0; i < list.length; i++)
    list[i] = list.length * i;
System.out.print( list[2] );
System.out.print( list[ list.length - 1] );
```

QUESTION 5

What is output by the code to the right?

- A. 313251
B. 94261
C. 913261
D. 913271
E. 01234

```
String name = "cade";
int[] data = {7, 13, 23, 5};
for(int i = 0; i < data.length; i++){
    if( i % 2 == 0 ){
        if( name.charAt(i) < 'c' )
            data[i] /= 3;
        else
            data[i] += name.charAt(i) - 'a';
    } else {
        data[i] -= name.charAt(i) - 'a';
    }
}
for(int i : data )
    System.out.print( i );
```

QUESTION 6

What replaces **<*1>** in the code to the right so that method test always returns false?

- A. ^ B. :: C. ||
D. && E. !

```
public boolean test(int x){
    return ( x < 12 ) <*1> ( x > 20 );
}
```

<p>QUESTION 7</p> <p>What is output by the code to the right?</p> <p>A. 369 B. 5811 C. 2712 D. There is no output due to a syntax error in the code. E. There is no output due to a runtime error.</p>	<pre>int x = 2; int[][] mat = new int[3][4]; for(int r = 0; r < mat.length; r++){ for(int c = 0; c < mat[0].length; c++){ mat[r][c] = x; x++; } } int c = mat.length; for(int r = 0; r < mat.length; r++){ System.out.print(mat[r][c]); c--; }</pre>
<p>QUESTION 8</p> <p>What is output by the code to the right?</p> <p>A. din B. dina C. ina D. inal E. "ina"</p>	<pre>String team = "cardinals"; System.out.print(team.substring(3,6));</pre>
<p>QUESTION 9</p> <p>What is output by the code to the right?</p> <p>A. 11 B. 22 C. 21 D. 12 E. 121</p>	<pre>int y = 15; int x = 10; if(x * y > x * x) System.out.print("1"); else System.out.print("2"); if(y * x != x * y) System.out.print("1"); else System.out.print("2");</pre>
<p>QUESTION 10</p> <p>What is output by the line marked // line 1 in the code to the right?</p> <p>A. [1, 1, 1, 1, 1] B. [1, 4, 1, 2, 3] C. f D. [3, 2, 1, 4, 1] E. [0, 0, 0, 0, 0]</p>	<pre>int[] data1 = {3, 2, 1, 4, 1}; ArrayList<Integer> f = new ArrayList<Integer>(); for(int i : data1) f.add(0, i); System.out.print(f); // line 1</pre>
<p>QUESTION 11</p> <p>What is output by the line marked // line 2 in the code to the right?</p> <p>A. [1, 1, 1, 1, 1] B. [1, 4, 1, 2, 3] C. f D. [3, 2, 1, 4, 1] E. [0, 0, 0, 0, 0]</p>	<pre>System.out.println(); for(int i = 0; i < 3; i++){ f.set(i, f.set(5 - i - 1, f.get(i))); } System.out.print(f); // line 2</pre>

QUESTION 12

What replaces **<*1>** in the code to the right so that when the default constructor in the `Pair` class is called the resulting `Pair` object's instance variable `val` is equal to 0 and the instance variable `s` refers to a `String` equal to "A" ?

- I. `s = "A"`
 - II. `Pair(0, "A")`
 - III. `this(0, "A")`
- A. I only B. II only C. III only
- D. I and II E. I and III

Assume **<*1>** is filled in correctly.

QUESTION 13

What replaces **<*2>** in the code to the right to declare a variable of type `Pair` named `p1` and makes `p1` refer to a new `Pair` object with `val` initialized to 5 and `s` initialized to "BA" ?

- A. `Pair p1 = Pair(5, "BA");`
- B. `Pair p1 = new Pair(5, "BA");`
- C. `Pair p1 = new Pair();`
- D. `Pair p1 = Pair("BA");`
- E. `Pair p1 = new Pair();`
`p1.val = 5;`
`p1.s = new String("BA");`

Assume **<*1>** and **<*2>** are filled in correctly.

QUESTION 14

When method `utep` is called, what is output by the line marked `// line 1` in the code to the right?

- A. BA5
- B. BA7
- C. BA76
- D. 6BA7
- E. A2

QUESTION 15

When method `utep` is called, what is output by the line marked `// line 2` in the code to the right?

- A. BA76
- B. A2
- C. A0
- D. BA7
- E. BA5

```
public class Pair{
    private int val;
    private String s;
```

```
    public Pair(){
        <*1>;
    }
```

```
    public Pair(int v, String st){
        val = v;
        s = st;
    }
```

```
    public String toString(){
        return s + val;
    }
```

```
    public void eoy(){
        val += 2;
    }
}
```

`// in a class other than Pair`

```
public void utep(){
    <*2>
    Pair p2 = rice( p1 );
    System.out.print( p1 ); // line 1
    System.out.println();
    System.out.print( p2 ); // line 2
}
```

```
public Pair rice(Pair p){
    p.eoy();
    p = new Pair( 4, p.toString() );
    p.eoy();
    return p;
}
```

<p>QUESTION 16</p> <p>What is output by the code to the right when method hsu is called?</p> <p>A. -3 B. 5 C. 0</p> <p>D. 1 E. -2</p>	<pre> public int tt(int x, int y){ x = x % 3; y++; int z = x * y; return z - 3; } public int aam(int z){ int x = z; int y = tt(z, x); x += z; return x + y + z; } public void hsu(){ System.out.print(tt(2, 3)); } </pre>
<p>QUESTION 17</p> <p>What is output by the code to the right when method ut is called?</p> <p>A. 822 B. 726 C. 228</p> <p>D. 257 E. 2626</p>	<pre> public void ut(){ int x = 7; int y = aam(x); System.out.print("" + x + y); } public void ts(){ int x = 2; int y = 4; System.out.print("" + x + y); int a = tt(y, x); System.out.print("" + a + x + y); } </pre>
<p>QUESTION 18</p> <p>What is output by the code to the right when method ts is called?</p> <p>A. 24724 B. 247 C. 24024</p> <p>D. 24013 E. 24725</p>	<pre> public void ut(){ int x = 7; int y = aam(x); System.out.print("" + x + y); } public void ts(){ int x = 2; int y = 4; System.out.print("" + x + y); int a = tt(y, x); System.out.print("" + a + x + y); } </pre>
<p>QUESTION 19</p> <p>What is returned by eval(new int[] {1,0,1,3,2,4,7}) ?</p> <p>A. 15 B. 18 C. 33</p> <p>D. 21 E. 7</p>	<pre> public int eval(int[] org){ int a, b; int t = 0; for(int i : org){ a = i % 2; b = i % 3; t += (a==0) ? i : (b==0) ? org[i] : (a+b); } return t; } </pre>
<p>QUESTION 20</p> <p>What is output by the code to the right?</p> <p>A. 9an ti j a gg\nies</p> <p>B. 9antijaggies</p> <p>C. 6an ti j a gg ies</p> <p>D. 6antijaggies</p> <p>E. 5antijaggnies</p>	<pre> String start = "an ti j a gg\nies"; String[] chop = start.split("\\s+"); System.out.print(chop.length); for(String s : chop) System.out.print(s); </pre>

<p>QUESTION 21</p> <p>What is output by the code to the right?</p> <p>A. 35 B. 8 C. 3 D. There is no output due to a syntax error in the code. E. There is no output due to a runtime error.</p>	<pre>String nums = "-3 9 ST -5 2 32a"; int sum = 0; Scanner s = new Scanner(nums); while(s.hasNext()){ if(s.hasNextInt()) sum += s.nextInt(); else s.next(); } System.out.print(sum);</pre>
<p>QUESTION 22</p> <p>What is output by the code to the right when method <code>show</code> is called?</p> <p>A. -401366 B. 6-40163 C. 013466 D. 6310-4 E. 66310-4</p>	<pre>public void move(int[] data, int i, int j){ int t = data[i]; data[i] = data[j]; data[j] = t; } public void sort(int[] d){ int m; for(int i = 0; i < d.length; i++){ m = i; for(int j = i + 1; j < d.length; j++){ if(d[m] < d[j]) m = j; } move(d, m, i); } } public void show(){ int[] data = {6, -4, 0, 1, 6, 3}; sort(data); for(int i : data) System.out.print(i); }</pre>
<p>QUESTION 23</p> <p>Which sorting algorithm is implemented by method <code>sort</code>?</p> <p>A. Insertion sort B. Bubble sort C. Quick sort D. Selection sort E. Merge sort</p>	
<p>QUESTION 24</p> <p>What is the expected running time of method <code>sort</code> on an array containing N items? Choose the most restrictive correct answer.</p> <p>A. $O(1)$ B. $O(\log N)$ C. $O(N)$ D. $O(N \log N)$ E. $O(N^2)$</p>	
<p>QUESTION 25</p> <p>What is output by the code to the right?</p> <p>A. 1 B. 2 C. 0 D. There is no output due to a syntax error in the code. E. There is no output due to a runtime error.</p>	<pre>double val = 1999.0; double div = 1000; double res = val / div; System.out.print((int)res);</pre>

QUESTION 26

What is returned by the method call `utpb(15138)` ?

- A. CABAAAAA
- B. AAAABAC
- C. AAAAAABAC
- D. CBAAAAA
- E. AAAAAABC

QUESTION 27

What argument to method `utpb` will cause the method to return the String "AACBA" ?

- A. 523 B. 1123 C. 2225
- D. Either A or B E. None of these.

QUESTION 28

What could replace the statement `res += "AA";` in case 5 so that method `utpb` functions exactly the same?

- A. `res += "A";`
`val = val * 10 + 5;`
- B. `res += "A";`
`val += val * 10 + 1;`
- C. `val = val * 10 + 2;`
- D. `val = ((val * 10) + 1) * 10 + 1;`
- E. More than one of these.

QUESTION 29

What is output by the code to the right?

- A. -1 B. 0 C. 1
- D. An integer less than -1.
- E. An integer greater than 1.

QUESTION 30

What is returned by `uhcl(50)` ?

- A. 9 B. 11 C. 8
- D. 2 E. 5

```
public String utpb(int val){
    String res = "";
    while( val > 0 ){
        int d = val % 10;
        val = val / 10;
        switch (d) {
            case 1: res += "A"; break;
            case 3: res += "BA"; break;
            case 5: res += "AA"; break;
            default:
                res += "C";
                val = val * 10 + 1;
        }
    }
    return res;
}
```

```
String name1 = "Marvin_Minsky";
String name2 = "Marvin_The_Martian";
System.out.print( name2.compareTo(name1) );
```

```
public int uhcl(int n){
    int result = 0;
    if( n >= 200 )
        result = 2;
    else
        result = 3 + uhcl( n * 2 );
    return result;
}
```

QUESTION 31

What replaces **<*1>** in the code to the right to throw an `IllegalArgumentException` if the precondition of method `acc` is not met?

- A. `if(ln == data.length)
 throw new IllegalArgumentException();`
- B. `if(ln <= data.length)
 throw new Exception();`
- C. `if(!(ln > data.length))
 throw new IllegalArgumentException();`
- D. `if(!(ln <= data.length))
 throw new IllegalArgumentException();`
- E. More than one of these.

```
//pre: ln <= data.length
public void acc(int ln, int[] data){
    <*1>
    // rest of method not shown
}
```

QUESTION 32

What is output by the following code segment?

```
int[] d = {0, 5, 1, 3, 2, 1, 3, 1, 2};
System.out.print( wiley(6, 3, d) );
```

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

```
//pre: num <= list.length
public int wiley(int gt, int num,
                 int[] list){

    int rt = 0;
    int n = 0;
    int lim = list.length;
    for(int i = 0; i < num - 1; i++)
        rt += list[i];
    for(int i = num - 1; i < lim; i++){
        rt += list[i];
        if( rt == gt )
            n++;
        rt -= list[i - num + 1];
    }
    return n;
}
```

QUESTION 33

What is returned by
`tlu("alanturing", "johnmccarthy")` ?

- A. 5 B. 6 C. 7
- D. 8 E. 9

```
public int tlu(String s1, String s2){
    int r = 0;
    String s3;
    for(int i = 0; i < s1.length(); i++){
        s3 = s1.substring(i, i+1);
        if( s2.contains( s3 )){
            r++;
        }
    }
    return r;
}
```

QUESTION 34

What is output by the code to the right?

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

```
int k = 73;
int n = 31;
int tot = 0;
while( k > n ){
    k /= 3;
    n /= 2;
    tot++;
}
System.out.print( tot );
```

QUESTION 35

What replaces **<*1>** in the code to the right so that the data type of `next` is a `Node` that contains the same type of data as this `Node`?

- A. `Node<this.E>`
- B. `Node<E>`
- C. `Object<E>`
- D. `LinkedList<E>`
- E. `Node<Object>`

```
public class Node<E>{

    public E data;
    public <*1> next;

}
```

Assume **<*1>** from Question 35 is filled in correctly

QUESTION 36

What is output by the following code segment?

```
SList<String> s = new SList<String>();
s.insert("A");
s.insert("C");
s.insert("B");
s.insert("A");
System.out.print( s );
```

- A. ABCA
- B. datadatadat
- C. ACBA
- D. ACB
- E. BCA

```
public class SList<E>{

    private Node<E> head;

    public SList(){
        head = new Node<E>();
    }

    public void insert(E data){
        Node<E> t;
        for( t = head; t.next != null;
            t = t.next);

        t.next = new Node<E>();
        t.next.data = data;
    }

}
```

QUESTION 37

What is output by the following code segment?

```
SList<String> s1 = new SList<String>();
ArrayList<String> a2
    = new ArrayList<String>();
s1.insert("A");
a2.add("A");
a2.add("C");
a2.add("B");
s1.insert(a2);
System.out.print( s1 );
```

- A. AACB
- B. ACBA
- C. ACB
- D. BCA
- E. There is no output due to a syntax error in the code.

```
public String toString(){
    String result = "";
    Node<E> t = head.next;
    while( t != null ){
        result += t.data;
        t = t.next;
    }
    return result;
}

}
```


QUESTION 38

Which statement below represents the truth table to the right? a, b, and c are all variables of type `boolean` .

- A. `c = (a || b) && !(a || b);`
- B. `c = (a && b) || !(a && b);`
- C. `c = (a || b) && (a || !b);`
- D. `c = (a || b) && !(a && b);`
- E. `c = a ~ b;`

a	b	c
false	false	false
false	true	true
true	false	true
true	true	false

QUESTION 39

What is output by the code to the right when method `sted` is called?

- A. 16
- B. 15
- C. 13
- D. There is no output due to a syntax error in the code.
- E. There is no output due to a runtime error.

```
//pre: list.length >= 6
public int middleVals(int[] list){
    int total = 0;
    int start = list.length / 2 - 3;
    int stop = list.length / 2 + 2;
    for(int i = start; i <= stop; i++){
        total += list[i];
    }
    return total;
}
```

QUESTION 40

What is the running time of method `middleVals` for an array containing `N` items? Choose the most restrictive correct answer.

- A. $O(1)$
- B. $O(N)$
- C. $O(\log N)$
- D. $O(N \log N)$
- E. $O(N^2)$

```
public void sted(){
    int[] vals = {2, 2, 3, 4, 3, 2, 1, 3, 5};
    System.out.print( middleVals(vals) );
}
```