

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 111_2 and 111_2 ?

- A. 41_{10} B. 112_3 C. 1111_2 D. 21_{10} E. 111_6

QUESTION 2

What is output by the code to the right?

- A. 8 B. 9
C. 11 D. 5
E. 7

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

QUESTION 3

What is output by the code to the right?

- A. 3.0 B. 5.0
C. 4.0 D. 6.0
E. There is no output due to a loss of precision error.

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

QUESTION 4

What is output by the code to the right?

- A. 9 B. 5
C. 10 D. 4
E. There is no output due to a syntax error.

```
String d = "1 2 3 4 5";
int cnt = d.length();
System.out.print( cnt );
```

QUESTION 5

What is output by the code to the right?

- A. 5 B. 4
C. 4.5 D. 5.0
E. There is no output due to a syntax error.

```
Integer[] array = {2,3,4,5,6,7};
Double sum = 0.0;
for( Integer it : array )
    sum = sum + it;
System.out.println( sum / array.length );
```

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 = 25;
System.out.print( Math.ceil( f % e ) );
```

QUESTION 7

What is output by the code to the right?

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

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

<p>QUESTION 8</p> <p>What is output by the code to the right?</p> <p>A. 1 B. 2</p> <p>C. 3 D. 13</p> <p>E. There is no output due to a syntax error.</p>	<pre>String aplus = "onlinepractice"; String upper = "ONLINEPRACTICE"; if(aplus.compareTo(upper) == 0) System.out.print("1"); else if(aplus.compareTo(upper) > 0) System.out.println("2"); else System.out.print("3");</pre>
<p>QUESTION 9</p> <p>Which of the following should replace <*1> in the LoftWing class at right so that the instance variables are only accessible inside of the LoftWing class?</p> <p>A. public</p> <p>B. private</p> <p>C. static</p> <p>D. A and B only</p> <p>E. A, B, and C</p>	<pre>public class LoftWing { <*1> String name; <*1> double size; public LoftWing(String n, double s) { name = n; size = s; } public String toString() { return "" + name + " " + size; } //other method / constructor //implementations not shown }</pre>
<p>QUESTION 10</p> <p>Assuming that <*1> is filled correctly, what is the output of the code at right?</p> <p>A. 0 0.0</p> <p>B. 0 10.0</p> <p>C. zelda 10</p> <p>D. zelda 10.0</p> <p>E. null 0</p>	<pre>//////////////////////////////////// //client code LoftWing it = new LoftWing("zelda", 10); System.out.println(it);</pre>
<p>QUESTION 11</p> <p>What is output by the code to the right?</p> <p>A. 3</p> <p>B. 4</p> <p>C. 5</p> <p>D. 6</p> <p>E. There is no output due to a runtime error.</p>	<pre>ArrayList<Integer> stuff; stuff = new ArrayList<Integer>(); stuff.add(3); stuff.add(5); stuff.add(7); stuff.add(2); stuff.add(4); stuff.add(6); System.out.println(stuff.size());</pre>

<p>QUESTION 12</p> <p>What is the <i>SMALLEST</i> value that the code at right could assign to the variable <code>find</code>?</p> <p>A. 0 B. 40 C. 100 D. 140 E. There is no output due to a syntax error.</p>	<pre>int find = Integer.MIN_VALUE; for(int i = 0; i < 10; i++) { int t = (int)(Math.random() * 100 + 40); if(t > find) find = t; }</pre>
<p>QUESTION 13</p> <p>What is output by the code to the right?</p> <p>A. invite B. invit\\e C. invit\e D. invite\\ E. There is no output due to a runtime error.</p>	<pre>System.out.println("invit\\e");</pre>
<p>QUESTION 14</p> <p>What is output by the code to the right?</p> <p>A. 10.45 B. 10.50 C. 10.46 D. 10.47 E. There is no output due to a runtime error.</p>	<pre>System.out.printf("%.2f", 10.4567);</pre>
<p>QUESTION 15</p> <p>What is the output by the code to the right ?</p> <p>A. 15 B. 12 C. 14 D. 13 E. 16</p>	<pre>String s = ""; for(int i = 0; i < 10; i+=2) s += "*"; for(int i = 0; i < 20; i+=2) s += "*"; System.out.println(s.length());</pre>
<p>QUESTION 16</p> <p>What is returned by the method call <code>goofy(5)</code>?</p> <p>A. 15.0 B. 12.5 C. 12.0 D. 13.0 E. There is no output due to a syntax error.</p>	<pre>public static double goofy(int x){ x = x * 5; x /= 2; return x; }</pre>

QUESTION 17

How many line of output are produced by the code to the right?

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

```
System.out.print( 45 );
System.out.println( 56 + 90 );
System.out.println( 35 );
System.out.print( 16 + 70 );
```

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	2.2 seconds
8,000	4.4 seconds

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

QUESTION 19

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

- I. "55"
 - II. 'x'
 - III. 256
- A. I only
 - B. II only
 - C. III only
 - D. I and II only
 - E. I and III only

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

QUESTION 20

What is the output by the code to the right?

- A. 5cks
- B. 6dahw
- C. 6rocks
- D. 5rld
- E. 5uil

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

<div>QUESTION 21</div> <div>What is returned by funny(7) ?</div> <div><div>A. 8</div><div>B. 28</div><div>C. 25</div><div>D. 15</div><div>E. 21</div></div>	<pre>public static int funny(int n) { int ans = 0; for(int a = 0; a <= n/2; a++) for(int b = 0; b <= n/2; b++) for(int c=0; c <= n; c+=2) { if(a + b + c == n) ans++; } return ans; }</pre>
<div>QUESTION 22</div> <div>What is returned by funny(12) ?</div> <div><div>A. 8</div><div>B. 28</div><div>C. 25</div><div>D. 15</div><div>E. 21</div></div>	
<div>QUESTION 23</div> <div>Which of the following is true of a full tree?</div> <div><div>A. All levels contain at least 1 node.</div><div>B. All levels are complete.</div><div>C. All nodes in the tree are in sorted order.</div><div>D. A and B only</div><div>E. A, B, and C</div></div>	
<div>QUESTION 24</div> <div>What is the output by the code to the right?</div> <div><div>A. 52</div><div>B. 697</div><div>C. 457</div><div>D. 3297</div><div>E. 217</div></div>	<pre>System.out.println((3 + 2) * 9 + "7");</pre>
<div>QUESTION 25</div> <div>What is output by the code to the right?</div> <div><div>A. 12</div><div>B. 34</div><div>C. 0</div><div>D. -12</div><div>E. There is no output due to a runtime error.</div></div>	<pre>int sum = -1; for (int a = -21; a < 55; a*=-2) sum += a%13; System.out.println(sum);</pre>

QUESTION 26

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

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

QUESTION 27

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

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

QUESTION 28

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

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

```
public class X{

    public int foo(A a){
        return 1;
    }

    public int foo (C c){
        return 2;
    }
}

public class Y extends X{

    public int foo(B b){
        return 3;
    }

}

public class Z extends Y{

    public int foo(A a){
        return 4;
    }

    public int foo(B b){
        return 5;
    }

    public int foo(C b){
        return 6;
    }

}

public class A{}
public class B extends A{}
public class C extends B{}

////////////////////////////////////
//////////client code
X thing = new Z();
A some = new C();
int not = thing.foo(some);
out.println(not); //line 1
thing = new X();
out.println(thing.foo(some)); //line 2
some = new B();
out.println(thing.foo(some)); //line 3
```

<p>QUESTION 29</p> <p>What is output by the code to the right?</p> <p>A. Secbfp B. Reddit C. 054285 D. Rules E. There is no output due to a runtime error.</p>	<pre>String x = "Reddit"; String y = ""; for(int i=0; i<x.length(); i++) y+=(char) (x.charAt(i)-(i-1)); out.println(y);</pre>
<p>QUESTION 30</p> <p>What is the output by the code to the right?</p> <p>A. TuringScholars B. ScholarsMachines C. Turing2015 D. TuringMachines E. Scholars2015</p>	<pre>String Turing = "Scholars"; String Machines = "2015"; out.println("Turing" + "Machines");</pre>
<p>QUESTION 31</p> <p>What is the output by the code to the right?</p> <p>A. 5 B. 15 C. 0 D. 8 E. 10</p>	<pre>out.println(15 10 ^ 11 & 14);</pre>
<p>QUESTION 32</p> <p>What is returned by the method call <code>n(4)</code>?</p> <p>A. -6 B. 91 C. 89 D. 1001 E. 101</p>	<pre>public static int n(int n) { if (n > 100) return(n - 10); return n(n(n + 11)); }</pre>
<p>QUESTION 33</p> <p>What is returned by the method call <code>n(1515)</code>?</p> <p>A. 1515 B. 1 C. 1505 D. 89 E. 91</p>	

QUESTION 34

After executing the client code at right, what is the value of `root.right.value`?

- A. root
- B. asdf
- C. cat
- D. dog
- E. left

QUESTION 35

After executing the client code at right, what is the value of `root.left.parent.value`?

- A. root
- B. asdf
- C. cat
- D. dog
- E. left

```
public class Node
{
    public Node parent;
    public Node left;
    public Node right;
    public String value;

    public Node(String v){
        value = v;
    }

    public Node getParent(){
        return right;
    }

    public Node getLeft(){
        return parent;
    }

    public Node getRight(){
        return left;
    }
}

////////////////////////////////////
////////client Code
Node root = new Node("root");
root.parent = new Node("asdf");
root.left = new Node("cat");
root.parent.left = new Node("dog");
root.left.parent = root.parent.left;
root.right = new Node("left");
```


QUESTION 36

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

- A. 46
- B. 17
- C. -42
- D. 1212
- E. 19

QUESTION 37

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

- A. [19, 24, 28, 25, 1212, 212, 46]
- B. [19, 24, 28, 25, 212, 1212, 46]
- C. [-16, 19, 17, 25, 1212, 212, 28]
- D. [-42, -16, 17, 19, 1212, 212, 28, 25]
- E. [-42, -16, 17, 19, 46, 212, 28, 25, 24, 1212]

QUESTION 38

Which of the following code segments would continually remove items from the Priority Queue as long as the current item is less than the value that will be added to the Priority Queue?

- A.

```
while(st.add(value) > st.remove())
    st.remove();
```
- B.

```
while(!st.isEmpty() &&
    value > (temp = st.remove())){
    st.add(temp);
    st.remove();
}
```

```
st.add(value);
```
- C.

```
while(!st.isEmpty() && value > st.remove())
    st.add(value);
```
- D.

```
while(!st.isEmpty() &&
    value > (temp = st.remove())){
    st.add(value);
}
```
- E.

```
while(!st.isEmpty() &&
    (value > (temp = st.remove()))){
    st.add(temp);
    st.add(value);
}
```

```
PriorityQueue<Integer> st;
st = new PriorityQueue<Integer>();

st.add(19);
st.add(25);
st.add(212);
st.add(17);
st.add(1212);
st.add(28);
st.add(-16);
st.add(-42);
out.println(st.remove()); //line 1

st.add(24);
st.add(46);
st.remove();
st.remove();
out.println(st); //line 2
```

QUESTION 39

After the code segment labeled //line 1 runs what is the value stored in mat[3][3]?

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

```
private class Fun
{
    private int[][] mat =
        {{3,2,2,1,3},
         {2,1,1,1,0},
         {1,4,2,1,2},
         {0,2,3,2,2}};

    private int[][] mat2 =
        {{0,1,0,-1},
         {1,0,-1,0}};
```

QUESTION 40

After the code segment labeled //line 2 runs what is the value stored in mat[3][3]?

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

```
public void w(int a, int b, int c)
{
    if(a<0||b<0||a>=mat.length)
        return;
    if(b>=mat[a].length)
        return;
    if(mat[a][b] != c)
        return;
    mat[a][b]++;
    for(int i=0;i<mat2[0].length; i++)
        w(a+mat2[0][i],b+mat2[1][i],c);
}

public void out()
{
    System.out.println(mat[3][3]);
}
```

```
////////////////////////////////////
////////client code
Fun ff = new Fun();
ff.w(1,1,1);
ff.out(); //line 1
ff.w(2,2,2);
ff.out(); //line 2
```