Note: Correct responses are based on Java, **J2sdk v 1.7.25**, 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. **For all output statements, assume that the System class has been statically imported...** ***import static java.lang.System.*;***

QUESTION 1

Which of these is NOT equivalent to 111011110_2 - $F2_{16}$?

A. 234_{10} B. 354_8 C. EC_{16} D. 11101100_2 E. All are equivalent

QUESTION 2

What is output by the code to the right?

A. 0.2 B. 0.6 C. 6.2

D. 7 E. 7.8

```
out.println(16 % 9 - 4 * 0.2);
```

QUESTION 3

What is output by the code to the right?

A.
```
Hello
Goodbye
4_
true
```

B.
```
HelloGoodbye
4_true
```

C. `Hello Goodbye 4_true`

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

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

```
out.print("Hello");
out.println("Goodbye");
out.printf("%s_%s\n",4,true);
```

QUESTION 4

What is output by the code to the right?

A. `balloonBomb` B. `balloonbomb`

C. `Balloonbomb` D. `BalloonBomb`

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

```
String s = "BalloonBomb";
s.toLowerCase();
out.println(s);
```

QUESTION 5

For which initial values of p and q will the code on the right output `false`?

A. `p=true, q=true;` B. `p=false, q=true;`

C. `p=true, q=false;` D. `p=false, q=false;`

E. None of these

```
boolean p=<value1>, q=<value2>;
out.println(p|!p&q);
```

QUESTION 6

Which of the following would most accurately replace `<datatype>` in the following expression?

A. `float` B. `double`

C. `char` D. `int` E. `long`

```
<datatype> num = Math.round(3.4);
```

QUESTION 7

What is output by the code to the right?

A. 25.0 B. 25.1

C. 28.0 D. 28.2

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

```
int a = 70;
double b = 5.2;
b += a /= 3;
out.println(b);
```

QUESTION 8

What is output by the code to the right?

A. `B==b` B. `B!=b`

C. There is no error, but there is no output.

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

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

```
char a = 'B';
char b = 'b';
if(a==b)
  out.println(a+"=="+b);
else
  out.println(a+"!="+b);
```

QUESTION 9

If c stands for column in the code to the right, what column would contain water when first detected?

A. column 3 B. column 5

C. column 15 D. column 14

E. It is not possible to determine this.

```
int c = 0;
boolean isWaterAhead = false;
while(!isWaterAhead)
{
  if((c+1)%5==0&&(c+1)%3==0)
     isWaterAhead=true;
  c++;
}
```

QUESTION 10

What is output by the code to the right?

A. `65` B. `57`

C. `129` D. `115` E. `147`

```
char[]list = new char[4];
list[1]=65;
list[3]=50;
int sum=list[1]+list[2]+list[3];
out.println(sum);
```

QUESTION 11

Which of these Java classes can be used in the input process, either from keyboard or from file?

I. File II. FileWriter III. Scanner IV. PrintWriter

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

E. All of these can be used for input

QUESTION 12

What is output by the code to the right?

A. `4 4.8` B. `6 115.20`

C. `13 9.6` D. `32 19.2`

E. `70 38.4`

```
int a = 0;
double b = 2.4;
while (a+b<25){
     b*=2;a+=b;
  }
out.println(a+" "+b);
```

QUESTION 13

What is output by the code to the right?

A. `40` B. `21`

C. `15` D. `11` E. `10`

```
int f = 5;
int g = f<<2+1;
out.println(g);
```

QUESTION 14

What is output by the code to the right?

A. `4` B. `8` C. `16`

D. `32` E. `64`

```
out.println(Float.SIZE);
```

QUESTION 15

What is output by the code to the right?

A. `[4, 1]` B. `[4, 1, 2]`

C. `[4, 1, 3]` D. `[4, 3, 2]`

E. There is no output due to a compile error

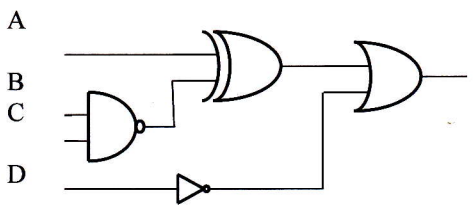
```
ArrayList<Integer> list = new
    ArrayList<Integer>();
list.add(4);
list.add(1);
list.add(3);
list.add(2);
list.remove(2);
out.println(list);
```

QUESTION 16

Which of the following logical statements is represented by the digital electronics diagram on the right ?

A. A^!(B&C)|!D B. A^(B&C)|D

C. A^ !(B|C)&!D D. A|!(B&C)^!D



QUESTION 17

How many times will the word **red** be output by the code to the right?

A. 36 B. 35 C. 26

D. 25 E. 24

```
for(int a=45;a<=80;a++)
out.print((a>50? a<75? "red":
           "green": "blue"));
```

QUESTION 18

What is output by the code to the right?

A. falsefalse B. falsetrue

C. truefalse D. truetrue

E. There is no output due to a compile error

```
String s = "UILRegion2014";
boolean p,q;
p = s.matches(".[^WIN]+.*");
q = s.matches(".............");
out.println(""+p+q);
```

QUESTION 19

What is output by **statement 1** in the code to the right?

A. The dog is a: dachshund

B. The animal is a: dachshund

C. The dog is a: mammal

D. The animal is a: mammal

E. There is no output.

QUESTION 20

What is output by **statement 2** in the code to the right?

A. The dog is a: dachshund

B. The dog is a: mammal

C. The type is: dachshund

D. The type is: mammal

E. There is no output.

QUESTION 21

Which of the statements below is most accurate?

A. In an inheritance situation as shown in the code to the right, early (static) binding occurs at run time, while late (dynamic) binding occurs at compile time.

B. In the client code to the right, the **show()** method that is called is the one that belongs to the Animal class.

C. In the client code to the right, the **type** instance variable that is used is the one that belongs to the Animal class.

D. All of the above statements are true.

E. None of these statements are true.

```
class Animal
{
  public String type = "mammal";
  public void show()
  {
     out.println("The animal is a: "
                 + type);
  }
}
class Dog extends Animal
{
  public String type;
  public Dog(String type)
  {
     this.type = type;
  }
  public void show()
  {
     out.println("The dog is a: "
                  + type);
  }
}
//client code
Animal doggie = new Dog("dachshund");
//statement 1
doggie.show();
//statement 2
out.println("The type is: "
            + doggie.type);
```

QUESTION 22

What is output by the code to the right?

A. 7 2 4 3 8 1 -24130- 1 2 3 4 7 8

B. 7 2 4 3 8 1 -24103- 1 2 3 4 7 8

C. 7 2 4 3 8 1 -21034- 1 2 3 4 7 8

D. 7 2 4 3 8 1 -21043- 1 2 3 4 7 8

E. 7 2 4 3 8 1 -21403- 1 2 3 4 7 8

QUESTION 23

Which algorithm process listed below best describes the code to the right?

A. Insertion sort

B. Quick sort

C. Merge sort

D. Bubble sort

E. Heap sort

QUESTION 24

What is the most restrictive bound on the runtime of this process, where N represents the number of items in list?

A. O(1)

B. O(N)

C. O(log N)

D. O(N log N)

E. O(N^2)

```
class SomeSort {
  static int[] numbers;
  static int[] helper;
public static void sort(int[] values)
{
    numbers = values;
    int number = values.length;
    helper = new int[number];
    somesort(0, number - 1);
}

public static void somesort(int low,
                            int high)
{
    if (low < high) {
      int middle=low+(high-low)/2;
      out.print (middle);
      somesort(low, middle);
      somesort(middle + 1, high);
      combine(low, middle, high);
    }
  }
public static void combine(int low,
              int middle, int high)
{
  for (int i = low; i <= high; i++) {
      helper[i] = numbers[i];
    }
  int i = low;
  int j = middle + 1;
  int k = low;
  while (i <= middle && j <= high) {
      if (helper[i] <= helper[j]) {
        numbers[k] = helper[i];
        i++;
      } else {
        numbers[k] = helper[j];
        j++;
      }
      k++;
    }
    while (i <= middle) {
      numbers[k] = helper[i];
      k++;
      i++;
    }
  }
}

//client code
int [] list = {7,2,4,3,8,1};
  for(int x:list)
     out.print(x+" ");
  out.print("-");
  SomeSort.sort(list);
  out.print("- ");
  for(int x:list)
     out.print(x+" ");
```

QUESTION 25

What is output by the code to the right?

A. 16 B. 24

C. 30 D. 36

E. There is no output due to a compile error

```
int [][] g = new int [5][];

for(int x=0;x<g.length;x++)
   g[x]=new int[(x+1)*2];
int d=0;

for(int r=0;r<g.length;r++)
   for(int c=0;c<g[r].length;c++)
      d++;

out.println(d);
```

QUESTION 26

What is output by the code to the right?

A. 5 B. 10 C. 54

D. 135 E. 525

```
out.println(Integer.toString(75,7));
```

QUESTION 27

What is output by the code to the right?

A. 12VLein

B. 24LUino

C. 24ILonU

D. 2L4ino

E. einVL21

```
String s = "Region UIL 2014";
char[]list = s.toCharArray();
PriorityQueue<Character> pq =
    new PriorityQueue<Character>();

for(int x = 0;x<list.length;x++)
{
  pq.add(list[x]);
  if(x%2==0)
     pq.remove();
}
for(char a:pq)
  out.print(a);
```

QUESTION 28

What is output by the code to the right?

A. 3 B. 7

C. 9 D. 14 E. 15

```
int a=13,b=4,c=7,d=6;
out.println(a^b&c|d);
```

QUESTION 29

What is output by the code to the right?

A. 001 010 101 110 B. 001 011 101 111

C. 000 010 100 110 D. 001 011 101 110

E. 000 010 101 110

```
for(int p = 0; p <= 1; p++)
  for(int q = 0;q <= 1; q++)
  {
     boolean P = p==1;
     boolean Q = q==1;
     boolean R = !(P|Q)|(P&!Q);
     int r = R?1:0;
     out.print(""+p+q+r+" ");
  }
```

QUESTION 30

What is output by the code to the right?

A. 0 B. 100

C. -245 D. 172 E. -2940

```
int a = (int)Math.pow(14,2);
int b = a>>4;
int c = b%5;
out.println(a-b*c);
```

QUESTION 31

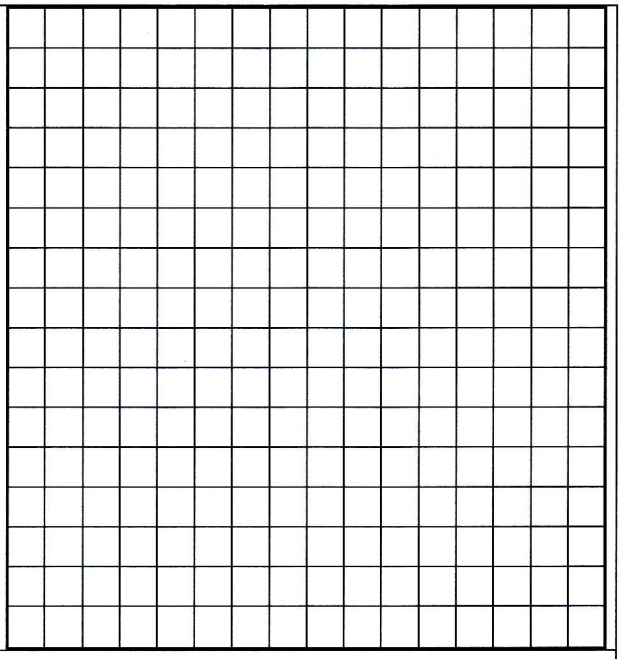
Consider the following recursive algorithm for painting a square:

1. Given a square with side length 16 feet
2. If the length of a side is equal to 1, stop the process for that square, otherwise continue.
3. Divide the square into 4 equal size squares.
4. Paint one of the these 4 smaller squares.
5. Return step 2 for each of the remaining 3 squares.

How many square feet of this square will be painted?

A. 256 B. 148 C. 175

D. 81 E. 64



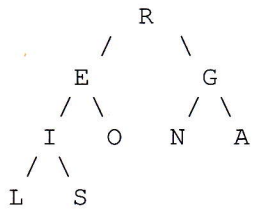
QUESTION 32

Which of the following is the preorder traversal of the tree shown to the right?

A. REILSONGA B. REILSOGNA

C. AEGILNORS D. LISEORNGA

E. LSIOENAGR



QUESTION 33

What is output by the code to the right?

A. [5, 1, 3, 6, 7]

B. [1, 3, 4, 5, 6, 7]

C. [4, 1, 3, 5, 6, 7]

D. [4, 5, 1, 3, 5, 6, 7]

E. [4, 5, 1, 3, 6, 7]

```
LinkedList<Integer>a = new
     LinkedList<Integer>();
a.offerFirst(4);
a.addLast(5);
a.element();
int [] list = {5,3,6,7,1};
Set<Integer> set = new
     TreeSet<Integer>();
for(int x:list)
     set.add(x);
a.addAll(set);
a.removeLastOccurrence(5);
out.println(a);
```

QUESTION 34

In the methods of the Queue interface, three pairs of methods are similar, with **`add()`** and **`offer()`** both inserting an element into the queue, **`peek()`** and **`element()`** both returning the head value of the queue without removing it, and **`poll()`** and **`remove()`** both returning and removing the head value. So what, if any, is the difference between each pair of methods? Select the statement below that accurately describes this situation.

A. **`add()`** throws an exception if the queue is full; **`offer()`** returns false without throwing an exception

B. **`peek()`** returns **`null`** if the queue is empty; **`element()`** throws an exception

C. **`poll()`** returns **`null`** if the queue is empty; **`remove()`** throws an exception

D. All of these statements are false
E. All of these statements are true

QUESTION 35

On the right is the definition of a Boat class. How many constructors are there in this definition ?

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

QUESTION 36

What is the output of the statement 1 in the client code below?

A. `skiff 1 1.5`
B. `"skiff" 1 1.5`
C. `1 1.5 skiff`
D. `1-hull "skiff": minimum 1.5 feet of water`
E. `1-hull skiff: minimum 1.5 feet of water`

QUESTION 37

Which of the following would most directly replace **code segment 2** to produce the output :

```
2-hull skiff: minimum 2.0 feet of water
```

I.
```
Boat b2 = new Boat(2);
b2.setDraft(2);
out.println(b2);
```

II.
```
Boat b2 = new Boat(2.0);
b2.setNumHulls(2);
out.println(b2);
```

III.
```
Boat b2 = new Boat("catamaran");
b2.setDraft(2);
b2.setNumHulls(2.0);
b2.setType("skiff");
out.println(b2);
```

A. I only
B. II only
C. III only
D. None of these
E. All of these

```
static class Boat
{
 private String type;
 private int numHulls;
 private double draft;

 public Boat(){
  type = "skiff";  numHulls = 1;
  draft = 1.5;
 }
 public Boat(int n){
  type = "skiff";numHulls = n;
  draft = 1.5;
 }
 public Boat(double n) {
  type = "skiff";numHulls = 1;
  draft = n;
 }
 public Boat(String n){
  type = n; numHulls = 1;
  draft = 1.5;
 }
 public void setType(String s){
  type = s;
 }
 public String getType(){
  return type;
 }
 public void setDraft(double d){
  draft = d;
 }

 public double getDraft(){
  return draft;
 }

 public void setNumHulls(int n){
  numHulls = n;
 }

 public int getNumHulls(){
  return numHulls;
 }

 public String toString(){
  return numHulls+"-hull "+type
         +": minimum "+draft
         +" feet of water";
 }
}

//client code
Boat b1 = new Boat();

//statement 1
out.println(b1);

//code segment 2
```

QUESTION 38

What is output by **`statement 1`** in the code to the right?

A. 65 B. -65

C. 97 D. -97

E. There is no output due to a compile error

QUESTION 39

What is output by **`statement 2`** in the code to the right?

A. 94 B. -94

C. 62 D. -62

E. There is no output due to a compile error

```
public static int myst(char[]list)
{
   int s = 0;
   for(char a:list)
          s+=a%2==0?a:-a;
   return s;
}
//client code
//statement 1
out.print(myst("bed".toCharArray()));



//statement 2
out.print(myst("MET".toCharArray()));
```

QUESTION 40

After the following elements {7, 2, 4, 9, 5, 6, 1} are correctly inserted into a min heap, which element is the right child of the root?

A. 2

B. 4

C. 5

D. 6

E. 7