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

What is 10001101000_2 plus 631_{10} ?

A. $4AC_{16}$ B. $6DF_{16}$ C. 11011101111_2 D. 1757_{10} E. 11011011011_2

QUESTION 2

What is output by the code to the right?

A. 1 B. -16 C. 5

D. 69 E. 73

```
int x = 16, y = x + 5;
int z = y % x + y * 4 - x;
out.println(z);
```

QUESTION 3

Which of the following correctly replaces `<*1>` in the code in order to print the output to the right?

A. `"%3d%5s%6f",n1,str,n2`

B. `"%4d%-8s%8.3f",n1,str,n2`

C. `n1+""+str+""+n2`

D. `"%-4d%8s%8.3f",n1,str,n2`

E. `n1+"\t"+str+"\t"+n2`

```
int n1 = 25;
double n2 = 3.19;
String str = "4631";
out.println("12345678901234567890");
out.printf(  <*1>  );

///////OUTPUT///////
12345678901234567890
  254631       3.190
```

QUESTION 4

How many `'e'`s are outputted in the code to the right?

A. 0

B. 3

C. 7

D. 5

E. 10

```
String x;
x = "wefrerewedewefre";
x.replace("e","fr");
x.replace("wf","e");
out.println(x);
```

QUESTION 5

What values for `a`, `b`, and `c` make the output to the right `true`?

A. `a` is true, `b` is false, `c` is true

B. `a` is true, `b` is false, `c` is false

C. `a` is true, `b` is true, `c` is true

D. `a` is false, `b` is true, `c` is false

E. A and B

```
boolean a, b, c, d;
d = !b && a || b && !a && c;
out.println(d);
```

QUESTION 6

What is the correct code for the equation to the right?

I. `x = Math.cbrt(15);`

II. `x = Math.pow(15,1.0/3);`

III. `x = 15^(1.0/3);`

A. II & III
B. I, II, & III
C. I only
D. II only
E. I & II

$$x = \sqrt[3]{15}$$

QUESTION 7

What is output by the code to the right?

A. 5480
B. 4520
C. 480
D. 5960
E. 4040

```
int sum = 5000;
for(int i=25; i<100; i+=10)
  sum-=i*2;
out.println(sum);
```

QUESTION 8

What is output by the code to the right?

A. 73
B. 168
C. 109
D. 72
E. 52

```
int x = 52;
switch(x%7)
{
    case 0: x += 38; break;
    case 5:
    case 1: x += 12;
    case 2: x += 9;   break;
    case 6:
    case 3: x += 20;
    case 4: x += 37;     break;
}
out.println(x);
```

QUESTION 9

How many lines are printed by the code to the right?

A. 5
B. 4
C. 6
D. 8
E. 7

```
String s = "SL CARDS";
    for(int i=s.length(); i>1; i--)
      out.println(s.substring(i-1));
```

QUESTION 10

What is output by the code to the right?

A. 77 B. 44 C. 51 D. 106 E. 90

```
int[] list={17,19,5,35,11,37,44,23};
int mid = (list.length-1)/2;
  list[mid]+=list[mid-1]+list[mid+2];
out.print(list[mid]);
```

QUESTION 11

Which of the following correctly replaces <*1> in the code to the right?

A. `input.hasNextDouble()`

B. `input.hasNextLine()`

C. `input.hasNext()`

D. `input.hasNextInt()`

E. all of the above

```
int x = 0;
String y = "25 36 42 15 1";
Scanner input = new Scanner(y);
while(<*1>)
  x += input.nextInt();
out.println(x);
```

QUESTION 12

What is output by the code to the right?

A. 19

B. 23

C. 17

D. 16

E. 18

```
int[] x = {3,1,2,3,1,4};
int i=4;
int count = 0;
while(x[i]!=0)
{
  count+=x[i];
  i=(i+x[i]--)%x.length;
}
out.println(count);
```

QUESTION 13

Which of the following has the lowestt precedent in java?

A. &

B. &&

C. + (String concatenation)

D. >>

E. <

QUESTION 14

What is output by the code to the right?

A. -128

B. -32768

C. 0

D. -1

E. -65535

```
out.println(Short.MIN_VALUE);
```

QUESTION 15

What is output by the code to the right if `list` contains

`[31, 33, 11, 4, 35, 7, 50]`?

A. [35, 7, 50, 31, 33, 11, 4]

B. [50, 7, 35, 4, 11, 33, 31]

C. [31. 33, 11, 4, 35, 7, 50]

D. [33, 4, 7, 50, 31, 11, 35]

E. There is no output due to a run-time error

```
ArrayList<Integer> list =
     new ArrayList<>();
// input an array
for(int i=0; i<list.size()/2; i++)
     list.add(list.remove(i));
out.println(list);
```

QUESTION 16

Which of the following correctly replaces <*1> in the code to the right such that the DW attributes are properly encapsulated?

A.
```
private String clan;
private int str;
```

B.
```
public String clan;
public int str;
```

C.
```
public String clan, int str;
```

D.
```
private String clan, int str;
```

E. more than one of these are correct

QUESTION 17

Which of the following code will replace <*2> in the code to the right such that compareTo will put a higher priority on the str than it does on the clan?

A.
```
return clan.compareTo(x.clan);
return str – x.str;
```

B.
```
if(clan.compareTo(x.clan)==0)
   return str - x.str;
return clan.compareTo(x.clan);
```

C.
```
return str – x.str ||
       clan.compareTo(x.clan);
```

D.
```
return str - x.str;
return clan.compareTo(x.clan);
```

E.
```
if(str == x.str)
   return clan.compareTo(x.clan);
return str - x.str;
```

```
class DW implements Comparable<DW>
{
  <*1>

  public DW(String name, int s)
  {
     clan = name;
     str = s;
  }

  public int compareTo(DW x)
  {
     if(str == x.str)
      return clan.compareTo(x.clan);
     return str - x.str;
  }

  public String toString()
  {
     return clan+"--"+str;
  }
}
```

QUESTION 18

What is output by line <*1> in the code on the right?

A. 57

B. 45

C. 151

D. 47

E. 150

QUESTION 19

What is output by line <*2> in the code to the right?

A. 60

B. 9

C. 46

D. 63

E. 45

```
int[][] mat = {{2,3,2,0},
               {3,4,4,5},
               {1,4,9,4},
               {2,1,2,1}};

int sum = 0;
for(int i=0; i<mat[0].length; i++)
  for(int j=0; j<mat.length; j++)
  {
     sum+=mat[j][i];
     mat[j][i]=sum;
  }

out.println(sum);          //<*1>
out.println(mat[2][3]);    //<*2>
```

QUESTION 20

What is output by the code to the right?

A. `8`

B. `240`

C. `248`

D. `0`

E. `200`

```
int x = 48;
int y = 38;
int z = x << 2 | y << 1 & x - y;
out.println(z);
```

QUESTION 21

What is stored in list after the method call `mys1(list,false,3)` if `list` was defined as `list[] = {2,6,4,3,5,8};`?

A. `[0, 2, 0, 0, 3, 7]`

B. `[0, 4, 2, 1, 3, 6]`

C. `[0, 4, 2, 1, 4, 8]`

D. `[1, 3, 1, 0, 3, 7]`

E. There is no output due to a run-time error

QUESTION 22

What is returned by the method call `mys1(list,false,3)` if `list` was defined as `list[] = {2,6,4,3,5,8};`?

A. `17`

B. `19`

C. `13`

D. `16`

E. There is no output due to a run-time error

```
public static int mys1(int[] list,
                       boolean x, int t)
{
  int s=0;
  int k;
  k = (x)?1:-1;
  while(list[t]>0)
  {
    if((t==list.length-1 && x)||
       (t==0 && !x))
    {-
      x=!x;
      s++;
      k*=-1;
    }
    list[t]--;
    t+=k;
    s++;
  }
  return s;
}
```

QUESTION 23

Which of the following correctly replaces <*1> and <*2> in the code to the right?

	<*1>	<*2>	<*3>
A.	extends	implements	extends
B.	implements	extends	extends
C.	implements	extends	implements
D.	implements	implements	implements
E.	extends	extends	extends

QUESTION 24

Which of the following is NOT true about the code to the right?

A. V9 is an Engine

B. V10 is an Engine

C. V8 is an Engine

D. V10 is a V8

E. more than one of these are NOT true

QUESTION 25

Which of the following correctly replaces <*4> in the code to the right?

A. V10

B. Engine

C. Object

D. V8

E. more than one of these are correct

QUESTION 26

What is output by the code on the right?

A. 1 33 1 2 8 2 1 4 1 2

B. 1 2 1 2 1 2 1 2 1 2

C. 1 33 6 2 8 2 1 4 1 2

D. 1 12 16 2 3 6 1 1 4 2

E. There is no output due to a syntax error

```
interface Engine
{
 public abstract int getFuel(int m);
}


class V8   <*1>   Engine
{
 private int x;
 public V8(int a)
 {   x = a;            }
 public int getFuel(int m)
 {   return m/x;       }
 public int getX()
 {   return x;         }
}


class V9   <*2>   V8
{
 public V9(int a)
 {   super(a);         }
 public int getFuel(int m)
 {   return m/(getX()*2);}
}


class V10   <*3>  Engine
{
 private boolean x;
 public V10(boolean k)
 {   x = k;            }
 public int getFuel(int m)
 {   return x?1:2;     }
 public int getX()
 {   return getFuel(0); }
}


////////////////////////////
/////CLIENT CODE/////////////
<*4>[] cars = new <*4>[10];
for(int i=0; i<cars.length; i++)
{
 switch(i%3)
 {
  case(1):cars[i]=new V8(i*3);
  case(2):cars[i]=new V9(i*4);
  case(0):cars[i]=new V10(i%2==0);
 }
}
for(<*4> x: cars)
 out.print(x.getFuel(100)+" ");
out.println();
```

QUESTION 27

What is output by the code on the right?

A. `[6, 13, 16, 28, 18, 24, 33, 41]`

B. `[13, 28, 6, 16, 33, 18, 41, 24]`

C. `[13, 6, 28, 16, 33, 18, 41, 24]`

D. `[6, 13, 16, 18, 24, 28, 33, 41]`

E. `[6, 16, 13, 24, 33, 18, 41, 28]`

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

int[] list = {13,28,6,16,33,18,41,24};
for(int x:list)
  pq.add(x);
out.println(pq);
```

QUESTION 28

Evaluate f(15)

A. `13`

B. `11`

C. `15`

D. `18`

E. `16`

QUESTION 29

What value must x be for f(x) = 26?

A. `21`

B. `26`

C. `18`

D. `24`

E. `22`

$$f(x) = \begin{cases} f(x-2)+5 & x > 10 \\ f(x-1)-2 & x > 5 \\ 6 & otherwise \end{cases}$$

QUESTION 30

Which of the following correctly replaces `<*1>` in the code to the right such that the value `112` is outputed?

A. `24` B. `37` C. `49` D. `3`

E. more than one of these are correct

```
int x = <*1>;
out.println(42^x^81^19);
```

QUESTION 31

What is output by the code on the right?

A. [6, 13, 14, 27, 28, 35, 48, 50]

B. [13, 35, 50, 48, 14, 28, 27, 6]

C. [13, 6, 35, 14, 28, 27, 50, 48]

D. [13, 35, 14, 50, 28, 6, 48, 27]

E. [50, 48, 35, 28, 27, 14, 13, 6]

```
class Node
{
  private int value;
  private Node left,right;
  public Node(int x)
  {     value = x;   }
  public int get()
  {     return value;}
  public Node left()
  {     return left; }
  public Node right()
  {     return right;}
  public void setLeft(int x)
  {     left = new Node(x);}
  public void setRight(int x)
  {     right = new Node(x);}
}

////////////////////////////////
/////////////STATIC METHODS//////
public static void add(Node ptr,
                       int x)
{
  if(ptr.get()<x)
     if(ptr.left()!=null)
        add(ptr.left(),x);
     else
        ptr.setLeft(x);
  else
     if(ptr.right()!=null)
        add(ptr.right(),x);
     else
        ptr.setRight(x);
}
public static void print(Node ptr)
{
  if(ptr!=null)
  {
     out.print(ptr.get()+" ");
     print(ptr.left());
     print(ptr.right());
  }
}

////////////////////////////////
/////CLIENT CODE/////////////////
int[] x = {13,35,14,28,50,6,48,27};
Node p = new Node(x[0]);
for(int i=1; i<x.length; i++)
  add(p,x[i]);
print(p);
```

QUESTION 32

What is output by the code on the right?

A. `6`

B. `18`

C. `14`

D. `8`

E. There is no output due to a run-time error

```
int[] x = {20, 29, 22, 18, 38, 41};
Stack<Integer> a = new Stack<>();
Stack<Integer> b = new Stack<>();
int i = 0;
for(int n:x) {
     while(!a.isEmpty()&&a.peek()>n){
        b.push(a.pop());
        i++;
     }
     a.push(n);
     while(!b.isEmpty()){
        a.push(b.pop());
        i++;
     }
}
out.println(i);
```

QUESTION 33

Which of the following correctly replaces `<*1>` in the code to the right?

A. `get`

B. `containsKey`

C. `contains`

D. `containsValue`

E. more than one of these are correct

QUESTION 34

What is output by the code on the right?

A. `[KEM, AUS, CR, BRA]`

B. `[KEM, AUS, CR, MC, BRA, KIN]`

C. `[AUS, BRA, CR, KEM, KIN, MAN]`

D. `[AUS, BRA, CR, KEM, KIN, MC]`

E. `[AUS, BRA, CR, KEM]`

```
class Tourny {
  private  Map<String,Integer> gm;
  public Tourny()
  {gm=new TreeMap<String,Integer>();}

  public void result(String win,
                     String los)
  {
     if(!gm.<*1>(win))
        gm.put(win,0);
     gm.put(win,gm.get(win)+1);
     if(!gm.<*1>(los))
        gm.put(los,0);
  }
  public Set<String> group(int w)
  {
     Set<String> s = new TreeSet<>();
     for(String x:gm.keySet())
        if(gm.get(x)==w)
           s.add(x);
     return s;
  }
  public String toString()
  {  return gm.toString(); }
}
///////CLIENT CODE////////////
Tourny t = new Tourny();
t.result("SL","KEM");
t.result("WES","FRI");
t.result("SL","CS");
t.result("AUS","FRI");
t.result("KEM","CS");
t.result("WES","AUS");
t.result("CR","KO");
t.result("MAN","KO");
t.result("MAN","CR");
t.result("BRA","MC");
t.result("KIN","BRA");
t.result("MC","KIN");
out.println(t.group(1));
```

QUESTION 35

Which of the following correctly replaces <*1> in the code to the right such that `true` is printed?

A. `"kkkfuuekkshjjskk"`

B. `"kkekkksakkk"`

C. `"kdbvkkkkakkkek"`

D. `"hkakkkksliekkls"`

E. `"kkaodiikekkskkk"`

```
String x = <*1>;
out.print(x.matches("k{2}.+k{3}.+k"));
```

QUESTION 36

Simplify the Boolean algebra statement on the right

A. true

B. `A(B + C)`

C. `A(!B + B) + A(!C + C)`

D. `!B + !C + A(B + C)`

E. false

```
!(BC)+A(B+!A)+AC
```

QUESTION 37

What is a possible value of `x` in the following expression?

```
LSHIFT-1(10110 AND RCIRC-3(x)) OR RSHIFT-2(11000 XOR 10011) = 00110
```

A. `10101`

B. `01010`

C. `01101`

D. `10111`

E. `11010`

QUESTION 38

Convert the prefix notation equation to the right into a infix notation equation.

A. `(A-B+C)/((A-B-C)*A*D*F*(C+B+A))`

B. `AB+C-AB-C-*AB*AB*C*AD+F+*/`

C. `(A+B-C)*(A-B-C)/(A*B*C*(A+D+F))`

D. `(A-B+C)*(A-B-C)/(A*D*F*(C+B+A))`

E. `A/(B*(C-A+B-A-B)*A*D*F*(C+B+A))`

```
/*-+ABC--ABC****++ADFCBA
```

QUESTION 39

OPEN ENDED QUESTION – Find the answer and write it on your answer sheet. If you are using a ScanTron form, write the question number and the answer on the bottom of the ScanTron.

What is the decimal value of the number to the right if it is being stored as a signed byte data type?

11011001_2

QUESTION 40

OPEN ENDED QUESTION – Find the answer and write it on your answer sheet. If you are using a ScanTron form, write the question number and the answer on the bottom of the ScanTron.

Write all the ordered triplets that will make the digital circuit diagram to the right true. Write a triplet in the form of `(A, B, C)`, where `A`, `B`, and `C` will either be a 0 or a 1. For example: `(1,1,1)` or `(0,1,1)`.