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 175_{10} minus 68_{16} ?

A. 70_{10} B. $A7_{16}$ C. 1000101_{2} D. 107_{8} E. 46_{16}

QUESTION 2

What is output by the code to the right?

A. 6 B. 7 C. 5 D. 0

E. There is no output due to runtime error.

```
int x = 6;
int y = x--;
int z = ++y;
x = z + x / (x * y) % z;
out.println(x);
```

QUESTION 3

What is output by the code to the right?

A. 67 B. 72 C. 73 D. 70 E. 75

```
int x = 150;
int sum = 0;
while(x>1)
{
  x/=3;
  sum+=x;
}
out.println(sum);
```

QUESTION 4

What is output by the code to the right?

A. lltown Dig B. halltown D

C. alltown Di D. wn Diggers

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

```
String x = "Marshalltown Diggers";
for(int i=0; i<x.length()/2; i++)
  out.print(x.charAt(i+5));
```

QUESTION 5

What is output by the code to the right?

A. 2361510 B. TCLG

C. VENI D. XGPK

E. 84677671

```
String q = "VENI";
String y = "";
for(int i=0; i<q.length(); i++)
  y+=(q.charAt(i)-2);
System.out.println(y);
```

QUESTION 6

What is output by the code to the right?

A. 22 35 37 35 22

B. 22 35 37 24 36

C. 35 22 34 31 17

D. 36 24 37 35 22

E. There is no output due to a index out of bounds error

```
Integer[] t = {36,24,37,35,22};
for(int i=0; i<t.length; i++)
  t[i] = t[t.length-1-i];
for(Integer i:t)
  out.print(i+" ");
```

QUESTION 7

Which answer is logically equivalent to the following boolean expression, where a, b, and c are boolean variables?

```
b && ( c && a || ( !c && ( a || c ) ) )
```

A. a && b && c B. a && b C. b || c D. b && c E. a || c

QUESTION 8

Which `String` is most likely output for the following code?

```
out.print(heroes((int)(Math.random()*10+1)));
```

A. `Cerebus`

B. `Batman`

C. `Superman`

D. `Wolverine`

E. `Spiderman`

QUESTION 9

Which `String` is most likely to be returned as the number being sent grows larger?

A. `Superman`

B. `Spiderman`

C. `Batman`

D. `Wolverine`

E. `Cerebus`

```
//pre : 0 <= x <= 100
public static String heroes (int x)
{
  if (x == 1)
     return "Batman";
  else if (x >= 2 && x < 6)
     return "Superman";
  else if (x >= 3 && x < 8)
     return "Spiderman";
  else if (x == 9)
     return "Wolverine";
  else
     return "Cerebus";
}
```

QUESTION 10

What can replace **<*1>** in the class to the right so that `getAdj` returns a `String` from the `adj` ArrayList?

A. `adj.get(random(size));`

B. `adj.get(random(adj.length));`

C. `adj.get(random(adj.size());`

D. `this.adj.get(random(adj.size()));`

E. more than one of these

QUESTION 11

What can replace **<*2>** in the class to the right such that it will return an integer between 0 and size -1?

A. `return (int)(Math.random()*size);`

B. `return (int)(random()*size);`

C. `return Math.random()*size;`

D. `return random()*size;`

E. `return (int)(Math.random()*adj.size());`

```
public class FantasyLand
{
  private ArrayList<String> adj;
  private ArrayList<String> gov;
  private ArrayList<String> land;

  public FantasyLand()
  {
     // code not shown
  }

  public String getAdj()
  {
     // <*1>
  }

  public String getGov()
  {
     // code not shown
  }

  public String getLand()
  {
     // code not shown
  }

  private int random(int size)
  {
     // <*2>
  }
}
```

QUESTION 12

What is output by the code to the right (*indicate a space)?

A. `**288**27`

B. `**1440027`

C. `288**0027`

D. `144****27`

E. There is no output due to syntax error.

```
int x = Math.pow(3,3);
int y = 18 << 4;
System.out.printf("%-5d%04d",y,x);
```

QUESTION 13

What is output by the code to the right ?

A. `\\\\`
`  \\`

B. `\\\\n\\\`

C. `\\\`
`  \\\`

D. `\\`
`    \\\\`

E. There is no output due to syntax error.

```
System.out.println("\\\\\\\n\\\\\\");
```

QUESTION 14

Which of the following most appropriately fills **<*1>** ?

A. `new String[4][4];`

B. `new String[9][4];`

C. `new String[10][5];`

D. `new String[100][100];`

E. `new String[10][10];`

```
String[][] x = <*1>;
x[5][3] = "Kirkland";
x[2][4] = "Dini";
x[8][1] = "Miller";
x[9][3] = "Moore";
x[0][1] = "Gaiman";
```

QUESTION 15

What is output by the code to the right?

A. `960` B. `80` C. `1000` D. `20` E. `1950`

```
int sum = 10;
for (int i=1; i<100; i++)
if(i/5==0 || i/5==2)
     sum+=i;
out.println(sum);
```

QUESTION 16

What is returned by the method call :

`something("wicked")` ?

A. `wiiccckkkkeeeedddd`

B. `wickedwickewickwic`

C. `wickedickedckedked`

D. `wickedd`

E. There is no output due to an infinite loop.

```
public String something(String y)
{
  if(y.length()>3)
     y.substring(1);
  else
     return y;
  return y+something(y);
}
```

QUESTION 17

What is output by the code to the right ?

A. `112` B. `224` C. `448` D. `42` E. `0`

```
System.out.println(7 << 3 << 4 >> 2);
```

QUESTION 18

Given that a method has a running time of $O(N^2)$, where N is equal to the size of data being used. The method took 12 seconds when it was run with N = 20,000. What is the expected time for the method to run when N = 40,000.

A. 30 seconds
B. 48 seconds
C. 24 seconds
D. 36 seconds
E. 144 seconds

QUESTION 19

What is the size of `list` after the code to the right is completed?

A. `23`
B. `22`
C. `17`
D. `25`
E. 0

```
ArrayList<Integer> list;
list = new ArrayList<Integer>();

for(int i=1; i<=100; i+=3)
  list.add(i*2-1);

for(int i=1; i<list.size(); i++)
  list.remove(i++);
```

QUESTION 20

Which call to the `stars` method would execute without error?

A. `stars(2)` B. `stars(4)`
C. `stars(1)` D. `stars(3)`
E. more than one of these

QUESTION 21

Which line of code in method `stars` should be changed so that the loop would terminate without error?

A. `x/=x-1;`
B. `x%=x+1;`
C. `x/=x++;`
D. `while(x>1)`
E. more than one of these

```
public static void stars(int x)
{
  while(x>0)
  {
     out.print("*");
     x%=x-1;
  }
}
```

QUESTION 22

What is returned by the method call `mystery(list)`, provided `list` is defined as

```
String[] list  = {"ideate", "okapi", "passe",
                              "mousse", "gyre"};
```

A. `[id, ok, pa, mo, gy]`

B. `[id, mo, gyre]`

C. `[idea, okap, pass, mous, gy]`

D. `[ideate, mousse, gyre]`

E. `[id, mo, gy]`

QUESTION 23

What is returned by the method call `mystery(list)`, provided `list` is defined as

```
String[] list = {"piacular", "deploy",
                    "naphtha", "subsume", "",
                         "proletarian","scot"};
```

A. `[pi, de, na, su, pr, sc]`

B. `[piacular, de, , scot]`

C. `[piac, depl, naph, subs, prol, scot]`

D. `[piacular, de, scot]`

E. `[pi, de, , scot]`

```
public static ArrayList<String>
                mystery(String[] list)
{
  ArrayList<String> s;
  s = new ArrayList<String>();

  for(String x:list)
     if(x.length()%4==0)
        s.add(x);
     else if(x.length()%3==0)
        s.add(x.substring(0,2));
  return s;
}
```

QUESTION 24

What is the output at **<*1>** in the code to the right?

A. `10 12 15`

B. `10 12 26`

C. `5 7 5`

D. `10 5 5`

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

QUESTION 25

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

A. `5 7 5`

B. `5 5 5`

C. `5 5 26`

D. `7 7 26`

E. `5 7 26`

QUESTION 26

What method can be added to class C that will allow the class to change the value of the parent's variable?

A.
```
public void change()
  { super.change(y*2); }
```

B.
```
public void change(int a)
  { x = a;  }
```

C.
```
public void change(int a)
  { super(a);      }
```

D.
```
public void change()
  { x = y*2; }
```

E. more than one of these

```
public class A
{
  private int x;

  public A()
  {  x = 0; }

  public int get()
  {  return x; }

  public void change(int a)
  {  x = a; }
}

public class B extends A
{
  private int x;

  public B()
  {  x = 0; }
}

public class C extends A
{
  private int y;

  public C()
  {  y = 0; }

  public int get()
  {  return y; }

  public void change(int a)
  {  y = a; }
}

////////////////////////////////////
////CLIENT CODE 1
A four = two;
B five = three;
one.change(10);
two.change(12);
three.change(15);
out.println(one.get()+" "+
   four.get()+" "+five.get()); //<*1>


////////////////////////////////////
////CLIENT CODE 2
A one= new A();
B two= new B();
C three = new C();
one.change(5);
two.change(7);
three.change(26);
out.print(one.get()+" "+two.get()+
          " "+three.get());    //<*2>
```

QUESTION 27

What would the output be if the code at right was run as shown below?

```
int[] gaiman = neil(20);
out.println(gaiman[4]);
```

A. 4

B. 2

C. 6

D. 10

E. 8

QUESTION 28

What would the output be if the code at right was run as shown below?

```
int[] gaiman = neil(20);
out.println(gaiman[15]);
```

A. 1974

B. 1220

C. 610

D. 466

E. 754

```
public static int[] neil(int x)
{
  int[] temp = new int[x];
  for(int i=0; i<x; i++)
     if(i<3)
        temp[i]=2;
     else
        temp[i]=temp[i-1]+temp[i-2];
  return temp;
}
```

QUESTION 29

What is returned by the method call `king(25)` ?

A. 17 B. 8 C. 9 D. 4 E. 13

QUESTION 30

What is returned by the method call `king(-25)` ?

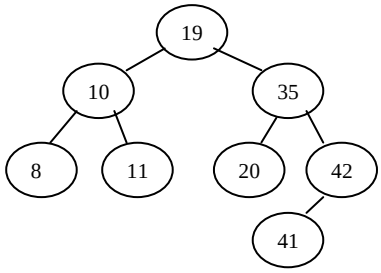
A. -15 B. -18 C. -9 D. -10 E. -7

```
public static int king(int x)
{
  if(x > 4 && x < 6)
     return x;
  else if (x < 4)
     return x - king(x+3);
  else if (x > 10)
     return x - king(x-4);
  else
     return x;
}
```

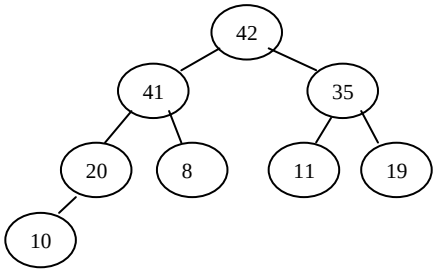
QUESTION 31

What would a min-heap tree look like with the following list: `19, 10, 35, 20, 8, 11, 42, 41`?

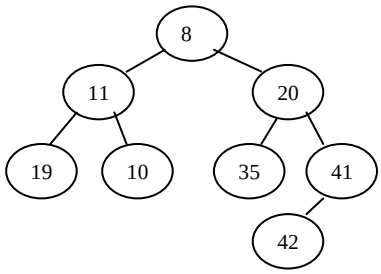
A.



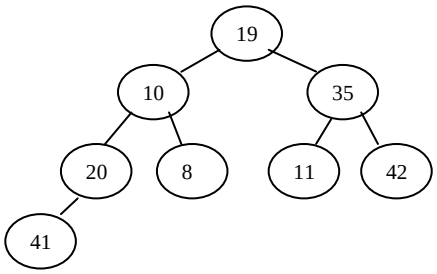
B.



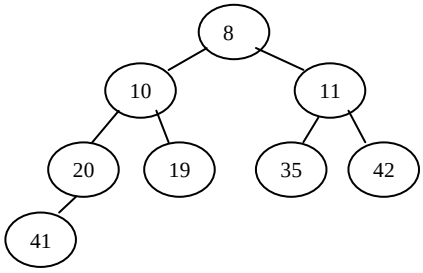
C.



D.

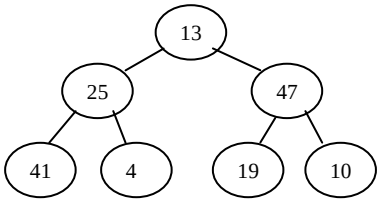


E.



QUESTION 32

Which of the following is an in-order traversal of the following tree?



A. `4, 10, 13, 19, 25, 41, 47`

B. `13, 25, 41, 4, 47, 19, 10`

C. `41, 4, 25, 19, 10, 47, 13`

D. `13, 25, 47, 4, 10, 19, 41`

E. `41, 25, 4, 13, 19, 47, 10`

QUESTION 33

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

A. `[14, 5, 20, 15, 43, 40]`

B. `[0, 1, 2, 3, …, 41, 42, 43]`

C. `[14, 15, 20, 40, 43, 5]`

D. `[5, 14, 15, 20, 40, 43]`

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

QUESTION 34

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

A. `[5, 14, 15, 43]`

B. `[5, 15, 43]`

C. `[5, 14, 15, 20, 40, 43]`

D. `[43]`

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

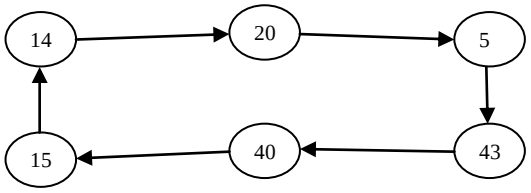
```
TreeMap<Integer,TreeSet<Integer>> x;
x = new TreeMap<Integer,TreeSet<Integer>>();

x.put(14,new TreeSet<Integer>());
x.put(5, new TreeSet<Integer>());
x.put(20,new TreeSet<Integer>());
x.put(15,new TreeSet<Integer>());
x.put(43,new TreeSet<Integer>());
x.put(40,new TreeSet<Integer>());
x.get(14).add(20);
x.get(5).add(5);
x.get(20).add(5);
x.get(40).add(15);
x.get(15).add(14);
out.println(x.keySet());          //1
x.get(43).add(40);
x.get(20).add(15);
x.get(5).add(43);
x.get(20).add(43);
x.get(5).add(20);
x.get(43).add(20);
x.get(15).add(40);
out.println(x.get(20));           //2
```

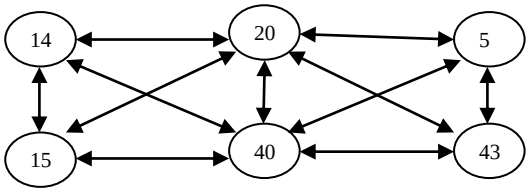
QUESTION 35

What would the graph look like from the code used in Question 33-34?

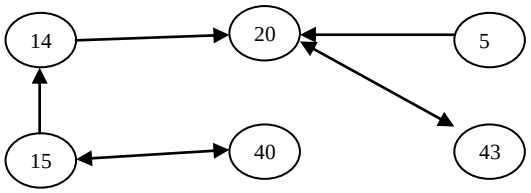
A.



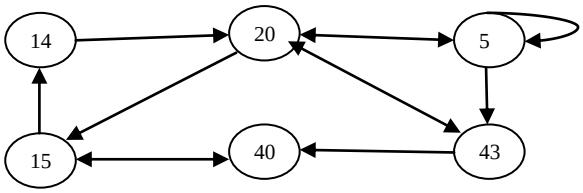
B.



C.



D.



E. There is no graph created due to a syntax error.

QUESTION 36

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

A. `[62, 40, 33, 46, 45]`

B. `[62, 40, 34, 33, 45, 46]`

C. `[8, 99, 102, 33, 0, 135, 186, 62]`

D. `[62, 40, 34, 33, 45]`

E. `[40, 34, 33, 45, 62]`

QUESTION 37

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

A. `[0, 99, 102, 33, 0, 135, 186, 62]`

B. `[135, 138, 186, 46, 45]`

C. `[120, 34, 891, 99, 297]`

D. `[135, 558, 186, 99, 45]`

E. `[360, 40, 186, 99, 138, 46]`

```
LinkedList<Integer> x;
x = new LinkedList<Integer>();
x.add(8);
x.add(1,40);
x.add(2,34);
x.add(2,33);
x.remove(0);
x.add(45);
x.set(2,46);
x.addFirst(62);
out.println(x);                    //1
for(Integer i: x)
  x.set(i%x.size(),i*3);
out.println(x);                    //2
```

QUESTION 38

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

A. `11` B. `9` C. `10` D. `8` E. `7`

QUESTION 39

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

A. `l be` B. `w th`

C. `l b` D. `with`

E. `w`

QUESTION 40

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

A. `fo` B. `th` C. `the` D. `f` E. `null`

```
String s;
s = "the force will be with you always";
String[] list;

list=s.split("[aeiou][^aeiou]");

out.println(list.length);          //1

out.println(list[4]);              //2

list=s.split("(?<=[aeiou])[^aeiou]");

out.println(list[1]);              //3
```