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 154_8 minus $5B_{16}$?

A. 111111_2 B. 19_{10} C. 11_8 D. 10001_2 E. 21_{16}

QUESTION 2

What is output by the code to the right?

A. 12 B. 6 C. 9 D. 14 E. 10

```
int x = 4;
int y = x--;
int z = 10;
out.print(z - x * (x + y) % y);
```

QUESTION 3

What is output by the code to the right?

A. 0 B. 75 C. 70 D. 30 E. 105

```
int n=30, sum=0;
while(n>0)
{
  sum+=n;
  n-=5;
}
out.println(sum);
```

QUESTION 4

What is output by the code to the right?

A. oaCynh B. Gh tKgs

C. Gta iyKihs D. ohmCT ngt

E. There is no output due to a syntax error

```
String x = "Gotham City Knights";
for(int i=0; i<x.length(); i+=3)
  out.print(x.charAt(i));
```

QUESTION 5

What is output by the code to the right?

A. vel Uni B. VEL UNI

C. t D. T

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

```
String x = "Matvel United";
int i = x.indexOf("v");
int z = x.indexOf("t",i);
x.toUpperCase();
x = x.substring(i,z);
out.println(x);
```

QUESTION 6

What is output by the code to the right?

A. 32 B. 14 C. 11 D. 27

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

```
int[] list = {11,31,23,32,27,14};
int x;
Arrays.sort(list);
x = Arrays.binarySearch(list,32);
System.out.println(list[++x]);
```

QUESTION 7

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

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

A. `a || b || c`

B. `a && b || c`

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

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

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

QUESTION 8

What is the value of String x at the end of the code to the right?

A. QC

B. om

C. ombieland

D. ieland

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

```
String x = "QC Zombieland";
switch(x.charAt(x.length()/2))
{
  case 'Q': x=x.substring(0,2);
  case 'C': x=x.substring(4,12);
     break;
  case 'b': x=x.substring(4,12);
  case 'Z': x=x.substring(0,2);
     break;
  default : x.toUpperCase();
}
```

QUESTION 9

Which of the following code instantiates an object of type Vs?

A. `Vs g = new Vs();`

B. `Vs g = new Vs("Pirates","Ninjas");`

C. `Vs g = super.Vs()`

D. `Vs g = new Vs(new Pirates(), new Ninjas());`

E. more than one of these

QUESTION 10

Which of the following can correctly replace **<*1>** in the class to the right?

A. `home = "Pirates";`

B. `home = home;`
`away = away;`

C. `away = "Ninja";`

D. `super(home,away);`

E. `this.home = home;`
`this.away = away;`

QUESTION 11

Which of the following can correctly replace **<*2>** in the class to the right?

A. `return String.format("%s %d\n%s %d",`
`home,away,homeScore,awayScore);`

B. `return getHome()+ " " + homeScore + "\n" +`
`getaway + " " +awayScore;`

C. `return String.format("%s %d\n%s %d",`
`home,homeScore,away,awayScore);`

D. A & C only

E. A, B, & C only

```
public class Vs
{
  private String home, away;
  private int homeScore, awayScore;

  public Vs(String away, String home)
  {
     <*1>
  }

  public String getHome()
  {     return home;  }

  public String getAway()
  {     return away;  }

  public void play()
  {  /* code not shown */  }

  public int getHomeScore()
  {  return homeScore;  }

  public int getAwayScore()
  {  return awayScore;  }

  public String toString()
  {
     <*2>
  }
}
```

QUESTION 12

What is output by the code to the right ?

A. 3.464 B. 144 C. 24.0 D. 90

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

```
out.printf("%x",Math.pow(12,2));
```

QUESTION 13

What is output by the code to the right ?

A. `story"`
B. `"\\brstroy`
C. `"\"\\\\\b\rstory\"`
D. `"\rstory"`
E. There is no output due to a syntax error.

```
out.println("\"\\\\\b\rstory\"");
```

QUESTION 14

What is stored in `mat[2][0]` ?

A. `0`
B. `4`
C. `12`
D. `16`
E. There is no output due to a runtime error.

```
int[][] mat = new int[4][4];
for(int i=0; i<4; i++)
  for(int j=0; j<4; j++)
     mat[j][3-i]=2*(i+1)*j;
```

QUESTION 15

What is output by the code to the right?

A. `45`
B. `72`
C. `76`
D. `48`
E. `60`

```
int sum = 0;
for(int i = 0; i<20; i+=5)
{
  sum+=i++ + ++i;
}
out.println(sum);
```

QUESTION 16

What is returned by the method call :

`mys("New Jersey Captains",5)` ?

A. `New Jersey Captains`
B. `ins`
C. `ptains`
D. `ersey Captains`
E. There is no output due to a runtime error.

```
public static String mys(String x,
                         int i)
{
  if(i<x.length())
     return mys(x.substring(i),i+3);
  return x;
}
```

QUESTION 17

What is output by the code to the right ?

A. `4`
B. `508`
C. `127`
D. `116`
E. `20`

```
out.println(127>>2&29<<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 5 seconds when it was run with N = 30,000. What is the expected time for the method to run when N = 60,000.

A. `10 seconds`
B. `20 seconds`
C. `15 seconds`
D. `5 seconds`
E. `8 seconds`

QUESTION 19

What is output by the code to the right?

A. `[Khans, Stars, Samurai, Roos, Dragons]`

B. `[Dragons, Roos, Samurai, Stars, Khans]`

C. `[Roos, Stars, Dragons, Khans, Samurai]`

D. `[Dragons, Khans, Roos, Samurai, Stars]`

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

```
ArrayList<String> list;
list = new ArrayList<String>();
list.add("Dragons");
list.add("Roos");
list.add("Samurai");
list.add("Stars");
list.add("Khans");
for(int i=0; i<list.size(); i++)
  list.add(list.remove(i));
System.out.println(list);
```

QUESTION 20

Which call to the method `mystery` would result in printing the same value as was passed as the argument?

A. `mystery(1);` B. `mystery(42);`

C. `mystery(23);` D. `mystery(54);`

E. there exists no such value

```
public static void mystery(int v)
{
  while(v>1)
  {
     out.print(v%7);
     v/=7;
  }
}
```

QUESTION 21

What is returned by the method call `mystery(438);`

A. `360` B. `154` C. `461` D. `164` E. `451`

QUESTION 22

What is returned by the method call `go(x)`, provided `x` is defined as
`Integer[] x = {2,5,8,9,10,13,48};`

A. `[]`

B. `[2, 5, 8, 9, 10, 13, 48]`

C. `[2, 5, 9, 13]`

D. `[2, 5]`

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

```
public static Set<Integer> go
                    (Integer[] list)
{
  Set<Integer> set = new
                  HashSet<Integer>();
  boolean good = true;
  for(Integer x:list)
  {
     for(Integer y:set)
        if(x%y==0)
           good = false;
     if(good)
        set.add(x);
  }
  return set;
}
```

QUESTION 23

What is returned by the method call `go(x)`, provided `x` is defined as
`Integer[] y = {6,3,43,25,50,27};`

A. `[3, 6, 25, 43]`

B. `[3, 25, 43]`

C. `[6, 3, 43, 25]`

D. `[3, 43, 25]`

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

QUESTION 24

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

A. `p * r – n * w;`

B. `points * correct() – neg * incorrect();`

C. `p * super.right – n * super.wrong;`

D. `this.points * right – this.neg * wrong;`

E. `p * super.correct() – n * super.incorrect();`

QUESTION 25

Assuming that **<*1>** has been filled correctly, what is output by the following when using the code on the right?

```
//client code
Scoring bob = new Contest(35,3,6,2);
out.println(bob.score());
```

A. `206` B. `204`

C. `146` D. `131`

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

QUESTION 26

Assuming that **<*1>** has been filled correctly, what is output by the following when using the code on the right?

```
// client code
Contest bill = new Contest(38,11,5,4);
Scoring ann = new Scoring(38,11);
out.println(ann.score() +" " + bill.score());
```

A. `77 146`

B. `206 146`

C. `77 204`

D. `131 146`

E. There is no output due to incompatible types

```
public class Scoring
{
  private int right, wrong;

  public Scoring(int r, int w)
  {
     right = r;
     wrong = w;
  }

  public int correct()
  {
     return right;
  }

  public int incorrect()
  {
     return wrong;
  }

  public int score()
  {
     return
     (int)(right*100/(right+wrong));
  }
}

public class Contest extends Scoring
{
  private int points, neg;

  Contest(int r, int w, int p, int n)
  {
     super(r,w);
     points = p;
     neg = n;
  }

  public int score()
  {
     return <*1>
  }
}
```

QUESTION 27

What would list hold after the running the code below with the code to the right?

```
int[] list = {48,29,24,36,25,22,6};
mystery(list,2,4,5);
```

A. [48, 29, 22, 24, 25, 36, 6]

B. [6, 22, 24, 25, 29, 36, 48]

C. [48, 29, 24, 25, 22, 36, 6]

D. [48, 29, 22, 24, 25, 36, 6]

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

QUESTION 28

What would list hold after the running the code below with the code to the right?

```
int[] list = {48,29,24,36,25,22,6};
mystery(list,0,3,6);
```

A. [6, 22, 24, 25, 29, 36, 48]

B. [36, 48, 25, 29, 22, 24, 6]

C. [48, 36, 29, 25, 24, 22, 6]

D. [36, 25, 22, 6, 48, 29, 24]

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

QUESTION 29

To which standard sorting algorithm does `mystery` belong?

A. insertion sort
B. merge sort
C. quick sort
D. bubble sort
E. selection sort

```
public static void mystery(
     int[] list, int x, int y, int z)
{
  int[] temp = new int[z-x+1];
  int L = x, R = y, c = 0;
  while(x<R && y<=z)
  {
     if(list[x]<list[y])
        temp[c++]=list[x++];
     else
        temp[c++]=list[y++];
  }
  while(x<R)
     temp[c++]=list[x++];
  while(y<=z)
     temp[c++]=list[y++];
  c=0;
  for(int i=L; i<=z; i++)
     list[i]=temp[c++];
}
```

QUESTION 30

What is returned by the method call `bad(19,3)` ?

A. 193
B. 3
C. 19
D. 102
E. 201

QUESTION 31

What is returned by the method call `bad(2450,20)`?

A. 216
B. 2452
C. 9
D. 6210
E. 126

```
public static String bad(int x,int y)
{
  if(x!=0)
  {
     int a = x%y;
     return bad(x/y, y)+a;
  }
  return "";
}
```

QUESTION 32

What values are in the root's right branch of the sorted binary tree if the following statements are true?

I. a pre-order traversal of the tree would return 36, 9, 6, 25, 23, 16, 15, 22, 24, 29, 26, 31, 39, 49, 47

II. an in order traversal of the tree would return 6, 9, 15, 16, 22, 23, 24, 25, 26, 29, 31, 36, 39, 47, 49

III. a post-order traversal of the tree would return 6, 15, 22, 16, 24, 23, 26, 31, 29, 25, 9, 47, 49, 39, 36

A. `6, 15, 16, 22, 23`

B. `39, 47, 49`

C. `22, 24, 26, 29, 31, 39, 47, 49`

D. `25, 26, 29, 31, 36, 39, 47, 49`

E. the root's right branch cannot be determined from the given data

QUESTION 33

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

A. `[Sea, Por, Por]`

B. `[Por, Sea]`

C. `[Sea, Cal, Por, Sea, Por, SF]`

D. `[Cal, Por, SF, Sea]`

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

QUESTION 34

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

A. `[Cal, SLC]`

B. `[LV, SF]`

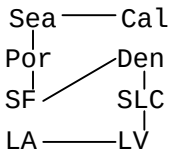
C. `[LA, SLC]`

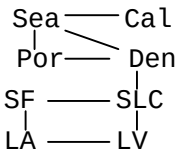
D. `[Cal, Por]`

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

QUESTION 35

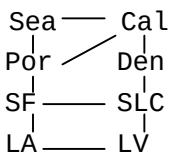
What would the graph look like from the code to the right?

A.


B.


C.


D.


E.



```
public static void
add(TreeMap<String,TreeSet<String>>g,
    String x,String y)
{
  if(!g.containsKey(x))
     g.put(x,new TreeSet<String>());
  g.get(x).add(y);
  if(!g.containsKey(y))
     g.put(y,new TreeSet<String>());
  g.get(y).add(x);
}

//Client Code
TreeMap<String,TreeSet<String>> g =
    new TreeMap<String,
                TreeSet<String>>();
add(g,"Sea","Cal");
add(g,"Por","Sea");
add(g,"Por","SF");
out.println(g.keySet()); //1
add(g,"LA","LV");
add(g,"Den","Cal");
add(g,"Den","SLC");
add(g,"Por","Cal");
add(g,"SF","SLC");
add(g,"LA","SF");
add(g,"SLC","LV");
out.println(g.get("Den")); // *2
```

QUESTION 36

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

A. `[41, 31, 24, 32, 35]`
B. `[26, 41, 31, 32, 24, 35]`
C. `[41, 1, 3, 0, 35]`
D. `[26, 41, 31, 32, 35]`
E. `[22, 24, 26, 31, 41]`

QUESTION 37

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

A. `[220, 240, 260, 310, 410]`
B. `[260, 410, 310, 320, 350]`
C. `[26, 41, 31, 32, 35]`
D. `[22, 24, 26, 31, 41, 220, 240, 260]`
E. There is no output due to a runtime error.

```
LinkedList<Integer> x;
x = new LinkedList<Integer>();
x.add(41);
x.add(1,31);
x.add(0,24);
x.add(3,32);
x.remove(0);
x.add(35);
x.addFirst(26);
out.println(x);       //1
for(Integer i: x)
  x.add(i*10);
out.println(x);       //2
```

QUESTION 38

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

A. `1` B. `10` C. `9` D. `8` E. `11`

QUESTION 39

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

A. `Here` B. `s` C. `Is` D. `ere`
E. There is no output due to a runtime error.

QUESTION 40

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

A. `H` B. `r` C. `c` D. `v` E. `null`

```
String x =
"WhatWeHaveHereIsFailureToCommunica";

String[] list = x.split("[A-Z]");
out.println(list.length);         //1

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

list = x.split("[aeiou]+");
out.println(list[list.length-1]); //3
```