COMP 248 - Tutorial #6 - Solution

More control structures, Type Casting & Arrays

Question 1: What is the output of:

A)

```
int x = 0;
while (x != 8);
{
  System.out.print("Hello");
  x = x + 1;
}
```

Answer: Infinite loop.
Since the boolean expression (x ! =8) is always true, so the loop “while (x != 8);” will be execute forever. The key error is that a “;” was put right after condition of the while loop. This means that the while loop is ending without any statement.

Correct version:

```
int x = 0;
while (x != 8)
{
  System.out.print("Hello");
  x = x + 1;
}
```

output:

```
HelloHelloHelloHelloHelloHelloHelloHello
```

B)

```
int x=0;
while (x != 8);
{
  System.out,print("Hello");
}
```

Answer: Infinite loop. Same problem with the “;” right after the condition of the while loop as last question.

Correct version:

```
int x=0;
while (x != 8)
{
  System.out,print("Hello");
  x=x+1; // Don’t forget to increment the control variable “x” inside the
statement of while loop.
}
```

C)

```
for (int j = 0; j <= 2; j++) //outer loop
{
      System.out.print(j);
       for (char ch = 'A'; ch <= 'M'; ch+= (3+j)) //inner loop
             System.out.print((char)(ch + 1));
       System.out.println();
}
```

Output:

```
0BEHKN
1BFJN
2BGL
```

D)

```
for (int i = 1;i < 9;i++)
{
        if (i%2 == 0) System.out.println( i + 1);
        else if (i%3 == 0) continue;
        else if (i%5 == 0) break;
        else System.out.println( "Not multiple of 2, 3 or 5.");
 }
System.out.println ("End");
```

Answer: This program breaks at iterator "i=5";the loop will end at "i=5" not "i=8".

Output:

```
Not multiple of 2, 3 or 5.
3
5
End
```

Question 2: Write a program to draw the following shapes using loops:

A)

```
*
**
***
****
*****
```

Answer:

```
public class Question3_a
{
  public static void main (String[] args)
  {
     for (int i=1;i<=5;i++)
     {
        for (int j=1;j<=i;j++)
           //Output ”*’ for each line (inner loop)
           System.out.print('*');

       //After output one line, change line (outer loop)
        System.out.print('\n');
     }
  }
}
```

B)

```
  *
 ***
*****
 ***
  *
```

Answer:

```
public class Question3_b
{
   public static void main (String[] args)
   {
      //loop iterator
      int i,j,k;

      //output the upper triangle, line by line, space first, and then "*"
      //    *
      //   ***
      //  *****
      for (i=1;i<=3;i++)
      {
          for (j=0;j<3-i;j++)
             System.out.print(' ');

          for (k=1;k<=5-2*j;k++)
             System.out.print('*');

          System.out.print('\n');
       }

       //output the lower triangle, line by line, space first, and then "*"
       //***
       // *
       for (i=1;i<=2;i++)
       {
          for (j=1;j<=i;j++)
             System.out.print(' ');

          for (j=1;j<=5-2*i;j++)
             System.out.print('*');

          System.out.print('\n');
       }
```

```
    }
}
```

Question 3: Write a program to ask the user for an integer then displays an "hour glass figure" as illustrated in the samples below.

Notes:

- Your code should work for odd and even numbers.
- Your code should check that the user enters an integer >=2. If it is not the case, the program should display an error message.

The following are three sample outputs to illustrate how your program should behave.

```
Enter an integer: 5
*****
 ***
  *
 ***
*****
```

```
Enter an integer: 6
******
 ****
  **
 ****
******
```

```
Enter an integer: 1
Error.
```

Answer:

```
import java.util.Scanner;
public class Question4
{
    public static void main(String[] args)
    {
        System.out.print("Please enter hour:");
        Scanner keyboard = new Scanner(System.in);
        int hour = keyboard.nextInt();

        if (hour<2) {
           System.out.print("Hour should be >=2. The End");
        }

        else {
           int i,j,k;

           //Output the upper triangle
           for(i=0; i<hour/2+hour%2; i++) {
              for (j=0;j<i;j++) {
                 System.out.print(' ');
              }
              for (j=0;j<hour-2*i;j++) {
                 System.out.print('*');
              }
              System.out.print('\n');
           }

           //Output the lower triangle
           int m=hour/2+hour%2;
           for (i=1; i<m; i++) {
              for (j=0; j<m-1-i; j++) {
                 System.out.print(' ');
              }
```

```
                    for (k=j; k<hour-j; k++) {
                       System.out.print('*');
                    }
                    System.out.print('\n');
                 }
              }
          }
      }
```

Question 4: Assume the following program:

```
public class Increment
{
    public static void main(String[] args)
    {
         int prevprev = 2;
         int prev = 2;
         int sum = 0;
         for (int i = 1; i < 4; i++)
         {
            sum = prevprev + prev;
            System.out.println(prevprev + " " + prev + " " + sum);
            prevprev = prev;
            prev = sum;
         }
    }
}
```

A- What is the output of this program?

Answer:

```
2 2 4
2 4 6
4 6 10
```

B- If we replace the **`for`** with the following lines, will the output be the same? If the output will be different, what will it be?

```
for (int i = 1; ++i < 4; )
```

Answer:

```
2 2 4
2 4 6
```

```
for (int i = 1; i < 4; ++i)
```

Answer:

```
2 2 4
2 4 6
4 6 10
```

Question 5: Write a Java program to find and display the smallest positive integer whose remainder:

- when divided by 3 is 1,
- when divided by 5 is 2, and
- when divided by 7 is 3.

Answer:

```
public static void main(String[] args) {
    int n = 0;
    while (!((n % 3 == 1) && (n % 5 == 2)&&(n % 7 == 3))){
        n++;
    }
    System.out.println("the smallest positive integer whose remainder: " +
        "\n-   when divided by 3 is 1," +
        "\n-   when divided by 5 is 2, and" +
        "\n-   when divided by 7 is 3.)" +
        "\n is  " + n);
}
```

Question 6: Write a nested `for` loop to display the following output:

```
a b c d e
b c d e
c d e
d e
e
```

Answer:

```
public static void main(String[] args) {
     int a = (int)'a';
     for (int i = 0; i<5; i++){
          for (int j = i; j <5; j++){
              System.out.print((char)(a + j) + " ");
          }
          System.out.println();
     }
}
```

Question 7: Given the following declarations, what is result is stored in each of the listed assignment statements?

```
int iResult, num1 = 25, num2 = 40, num3 = 17, num4 = 5;
double fResult, val1 = 17.0, val2 = 12.78;
```

```
A. fResult = (double) num1 / num2;        // 0.625
B. fResult = num1 / (double) num2;        // 0.625
```

```
C. fResult = (double) (num1 / num2);      // 0.0
D. iResult = (int) (val1 / num4);         // 3
E. fResult = (int) (val1 / num4);         // 3.0
F. fResult = (int) ((double)num1 / num2);// 0.0
```

Question 8: What will be displayed by the following?

A)

```
int i;
int a[] = {5, 2, 3, 1, 1, 0, 2, 1, 0, 1};
for (i = 0; (i < 10); i++)
{
     if (a[i] == 0)
        break;
     if (i % 3 == 0)
        continue;
     System.out.print(a[i]);
}
```

Answer:

```
231
```

B)

```
class Parray {
   public static void main(String[] args)
   {
       int[] data = {1,3,5,8,11,15};
       int sum = 0;
       for(int i = 1; i < data.length; ++i) {
          sum = sum + data[i] - data[i-1];
          System.out.println("sum  = " + sum);
       }
   }
}
```

Answer:

```
     sum  = 2
     sum  = 4
     sum  = 7
     sum  = 10
     sum  = 14
```

C)

```
class Parray
{
  public static void main(String[] args)
  {
    int[] data = {1, 2, 3, 4, 5, 6, 7};
    boolean[] filter = {true, false, true, true, false, true, true};

    int sum = 0;
    for (int i = 0; i < data.length; ++i)
      if (filter[i])
         sum = sum + data[i];
    System.out.println("data:" + sum);

    for(int i = 0; i < filter.length; ++i)
       filter[i] =  !filter[i];

    sum =0;
    for (int i = 0; i < data.length; ++i)
      if (filter[i])
         sum = sum + data[i];

    System.out.println("data:" + sum);
  }
}
```

Answer:

```
data:21
data:7
```