Question 1 ................................................................. (5 points)
   How many bits in a Java byte?
   How many bytes in a Java short?
   How many bytes in a Java int?
   How many bytes in a Java float?
   How many bytes in a Java double?

Question 2 ................................................................. (10 points)
   Circle and describe all syntax errors in the following program fragment:

       double value;
       double 2ndValue = value;
       if (value=2ndValue) {
           System.out.println("equal");
       } else {
           System.out.println("not equal")
       }

Question 3 ................................................................. (10 points)
   In the Java statement

       public static final float SQRT_THREE = (float)Math.sqrt(3.0);

   what is the purpose of
   • the keyword static?
   • the keyword final?
   • the operator (float)?

   Which of these if omitted would cause a syntax (compile) error?
Question 4 ........................................................................ (15 points)

(a) Complete this method, using drawLine(int x1, int y1, int x2, int y2)
in the Java standard class Graphics to draw four line segments that make
a 3-by-3 grid, as for the game tic-tac-toe, that fills a panel with specified
total width w and height h. If the w and h are not equal, then the grid cells
need not be square.

public void draw3x3Grid(Graphics g, int w, int h) {
}

(b) Complete this method, which is like that above, but draws an n-by-n grid.

public void drawNxNGrid(Graphics g, int w, int h, int n) {
}

Question 5 ........................................................................ (10 points)

Complete the following method, to return the median of three specified values.

public static double median(double a, double b, double c) {

}
Question 6. Complete the following method, which returns a new array that contains the subset \( x[1], x[3], x[5], \ldots \) of elements from the specified array \( x \).

```
public static float[] subsetWithOddIndices(float[] x) {
}
```

Question 7. Many exceptions in Java must be caught. In methods like that above, why are you not required to catch an `ArrayIndexOutOfBoundsException`?

Question 8. Complete the following methods, each of which returns the sum of values in a specified array. Call the first method in your implementation of the second method.

```
public static float sum(float[] a) {
}

public static float sum(float[][] a) {
}
```
Question 9 ......................................................................................................................... (10 points)

(a) Complete the following two methods, which return the indices of the first and last non-zero values in the specified array.

```java
public static int firstNonZero(float[] x) {
}

public static int lastNonZero(float[] x) {
}
```

(b) Complete the following method, which returns a new array that is a copy of the specified array $x$, but without any leading or trailing zeros. Use the methods above to determine which elements to copy; the length of the returned array is less than or equal to the length of the specified array $x$.

```java
public static float[] trim(float[] x) {
}
```
Question 10...................................................................................... (15 points)

(a) Write code that defines an interface `Shape` with one method `contains` that, given a `float x` and a `float y`, returns `true`, if the point \((x,y)\) lies inside the `Shape`, or `false`, otherwise.

(b) Write code that defines a class `Circle` that correctly implements the interface `Shape`. The class `Circle` has a constructor with three parameters: the center coordinates \(x\) and \(y\), and radius \(r\), with corresponding fields.

(c) Write a complete Java program that constructs a `Circle` object and then uses that object to determine and print whether or not the point \((5,3)\) lies inside.