Question 1 ................................................................. (15 points)

What is printed by the following Java statements?

```java
int x = 9 / 9 + 3 * 4;
int y = x / 4;
int z = x % 4;
System.out.println("x="+x+" y="+y+" z="+z);
x = 6; y = 6; z = 6;
--x; ++y; z /= 3;
System.out.println("x="+x+" y="+y+" z="+z);
for (int i=0; i<4; ++i)
    System.out.print(i); // not println!
for (int i=4; i>0; --i)
    System.out.print(i); // not println!
System.out.println();
int n = 5;
while (n!=1) {
    if (n%2==0) {
        n = n/2;
    } else {
        n = 3*n+1;
    }
    System.out.println(n);
}
```

Question 2 ................................................................. (5 points)

Complete the following method, which returns the smallest integer that is greater than or equal to the specified value. Ensure that your method works for both negative and non-negative values of x.

```java
public static int ceiling(double x) {
```
Question 3 ................................................................. (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 4 ................................................................. (5 points)
   Complete the following method, which returns the number of negative values in
   the specified array.

   public static int countNegativeValues(float[] x) {

   }

Question 5 ................................................................. (10 points)
   Complete the following method, which returns a new array containing only the
   negative values in the specified array.

   public static float[] getNegativeValues(float[] x) {

   }
Question 6 ......................................................... (10 points)
Complete the following method, which returns a new 1D array with all of the elements copied from the specified 2D array x.

```java
public static float[] twoToOne(float[][] x) {
    // implementation
}
```

Question 7 ......................................................... (15 points)
Complete the following method, which reads a binary file containing a sequence of $500 \times 500$ ints, pixels of an image that are returned as a 2D array of floats. (Hint: do not construct a 2D array of ints.)

```java
public static float[][] readImage(String fileName) {
    // implementation
}
```
Question 8

(a) [15 points] Implement all methods for the following class:

```java
/** A fuel tank has a width, height, and depth. */
public class FuelTank {

    /** Constructs an empty fuel tank with specified dimensions. */
    public FuelTank(double width, double height, double depth) {
        // declare private
        // fields here
    }

    /** Returns the capacity of this tank, the volume of fuel it
     * contains when completely full. */
    public double getCapacity() {
    }

    /** Returns the fraction (a number between zero and one) of tank
     * capacity that is currently consumed by fuel in this tank. */
    public double readFuelGauge() {
    }

    /** Attempts to add the specified volume of fuel to this tank.
     * Less than the specified volume of fuel will be added if the
     * tank becomes full. Returns the actual volume added. */
    public double addFuel(double volume) {
    }

    // declare private
    // fields here
}
```
(b) [10 points] This part of the question is about using a class. Specifically, using the methods of the class FuelTank defined above, implement the method main for the following class:

```java
/**
 * Demonstrates use of the class FuelTank.
 * (1) Constructs a tank with width 0.5 m, height 0.1 m, and depth 0.3 m.
 * (2) Uses the constructed fuel tank to print its capacity.
 * (3) Adds 100 liters (0.1 cubic meters) of fuel to the tank.
 * (4) Prints the actual volume of fuel added.
 */
public class FuelTankDemo {
    public static void main(String[] args) {

        // Your implementation goes here
    }
}
```

Question 9 .............................................................. (10 points)

Complete the following Java method, which computes and then prints the value of the sum $\frac{1}{2} + \frac{2}{3} + \cdots + \frac{n-1}{n}$, for a specified n. (Hint: the value is not zero.)

```java
public static void printSumOfFractions(int n) {

    // Your implementation goes here
}
```