Question 1 ............................................................. (20 points)

(a) Specify (by writing either true or false alongside each statement) the values of the six boolean variables computed as follows:

\[
\begin{align*}
\text{double } x & = 3.14; \\
\text{int } y & = 3; \\
\text{boolean } b1 & = x/4>0; \\
\text{boolean } b2 & = y/4>0; \\
\text{boolean } b3 & = x>y \land y<0; \\
\text{boolean } b4 & = x<y \land y>0; \\
\text{boolean } b5 & = x>y \lor y<0; \\
\text{boolean } b6 & = x<y \lor y>0;
\end{align*}
\]

(b) What is printed by the following program fragment?

\[
\begin{align*}
\text{int } j & = 1; \\
\text{int } k & = 11; \\
\text{for (int } i=1; i<10; i+=2) \{ \\
& j = j*2; \\
& k = k%2; \\
& \text{System.out.println("i="+i+" j="+j+" k="+k);} \\
\}
\end{align*}
\]

(c) Assume that you have stored the radius of a circle in a float \textit{r}. Using a standard Java class to obtain an approximation to \pi (a double), write a single Java statement that computes the area of the circle and stores it in a float \textit{a}. 

\[
\begin{align*}
\text{float } a & = \pi r^2;
\end{align*}
\]
Question 2 ................................................................. (15 points)

(a) Draws a target with five rings with diameters 10, 20, 30, 40 and 50 pixels, all centered at coordinates $(x,y) = (100,100)$ pixels. The alternating ring colors are black, white, black, white, and black.

```java
public static void drawTarget(Graphics g) {
    // Code to draw the target
}
```

(b) Prints the sum of only the odd integers in the specified set \( \{a, b, c, d\} \). If all four of the integers are even, prints zero.

```java
public static void printSumOfOdd(int a, int b, int c, int d) {
    // Code to calculate the sum of odd numbers
}
```

(c) Returns the sum of the cubes of the first \( n \) whole numbers, that is, \( 1 + 8 + 27 + \ldots + n^3 \). (Use simple multiplication to compute the cube of each of the integers.)

```java
public static int sumOfCubes(int n) {
    // Code to calculate the sum of cubes
}
```
Question 3 ......................................................... (15 points)
Assume that you have a class Stopwatch that works much like a real stopwatch, with the following methods

- public void start() starts the stopwatch
- public void stop() stops the stopwatch
- public double time() returns (does not print!) the number of seconds that have elapsed between start and stop
- public void reset() resets the stopwatch so that the number of elapsed seconds is zero

(a) Write a Java program fragment (not a complete program) that constructs a Stopwatch and then uses its methods defined above to determine and print the number of seconds required to compute sumOfCubes(1000000). (Here, do not write any code for the class Stopwatch; see part (b) below.)
(b) Assume that the method `Clock.seconds()` returns a `double` equal to the number of seconds that have elapsed since January 1, 2013. Use this method to write the Java class `Stopwatch` that implements the four methods specified above. Include in your class everything necessary to implement these methods.