Instructions: This is the second homework for CS170 (Section 002). Unlike labs, you are expected to do homework on your own. Future homework will involve programming, but this second one, just as the first one, is mostly written, and you should turn it in on paper.

Honor Code: Like all work for this class, the Emory Honor Code applies. You should do your own work on all problems, unless you are explicitly instructed otherwise. If you get stuck or have questions, ask your instructor or a TA for help.

Initial here to indicate that you followed the Honor Code and this work is your own. _______________

1. (24 pts) Fill out the following table. Evaluate the Java expression in the first column and put the result in the second column. Assume that each expression is evaluated independently (ie, not in sequence). In the third column indicate the datatype of the result. The first row has been done for you.

(Note: you can answer these questions using the Java compiler, and if you do this, you will miss out on a chance to learn. You will be asked to do similar problems on the midterm and you will not have access to a Java compiler. I do recommend you write these statements inside a Java program after you have done the homework. You can check your answers --- if you have errors, understand why. )

You have the following variables declared and initialized:
double a = 13.0;
double b = 8.0;
int i = 15;
int j = 4;

<table>
<thead>
<tr>
<th>Java Expression</th>
<th>Result</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>i + j</td>
<td>19</td>
<td>int</td>
</tr>
<tr>
<td>b / j</td>
<td>2.0</td>
<td>double</td>
</tr>
<tr>
<td>i % j</td>
<td>3</td>
<td>int</td>
</tr>
<tr>
<td>2<em>i+3</em>j+b</td>
<td>50.0</td>
<td>double</td>
</tr>
<tr>
<td>i + (double) j</td>
<td>18.0</td>
<td>double</td>
</tr>
<tr>
<td>b / (i-a) * j</td>
<td>16.0</td>
<td>double</td>
</tr>
<tr>
<td>(int) (a / j)</td>
<td>3</td>
<td>int</td>
</tr>
<tr>
<td>(i++) + (++j)</td>
<td>20</td>
<td>int</td>
</tr>
<tr>
<td>(double)(+++ i / j)</td>
<td>3.0</td>
<td>double</td>
</tr>
</tbody>
</table>
2. (18 pts) Evaluate each statement and find the errors. In case of an error, suggest an appropriate casting. You have the following variables declared and initialized:

```
int i1 = 3, i2 = 5;
double d1 = 4.0, d2 = 6.0;
float f1 = 7.0f;
```

<table>
<thead>
<tr>
<th>Java Statement</th>
<th>Compile Result</th>
<th>Casting Option (if required)</th>
</tr>
</thead>
<tbody>
<tr>
<td>float f2 = 3.0</td>
<td>Error</td>
<td>float f2 = (float) 3.0;</td>
</tr>
<tr>
<td>double d3 = d1 + d2;</td>
<td>Correct</td>
<td>-</td>
</tr>
<tr>
<td>int i3 = i1 + d2;</td>
<td>Error</td>
<td>int i3 = i1 + (int)d2; or int i3 = (int)(i1 + d2);</td>
</tr>
<tr>
<td>float f2 = f1 + d2;</td>
<td>Error</td>
<td>float f2 = f1 + (float)d2; or float f2 = (float) (f1 + d2);</td>
</tr>
<tr>
<td>double d3 = i1 + i2;</td>
<td>Correct</td>
<td>-</td>
</tr>
<tr>
<td>short s1 = i1;</td>
<td>Error</td>
<td>short s1 = (short) i1;</td>
</tr>
<tr>
<td>double i3 = (i1 * d2);</td>
<td>Correct</td>
<td>-</td>
</tr>
<tr>
<td>int i3 = (int)(d2 / d1 + f1);</td>
<td>Correct</td>
<td>-</td>
</tr>
</tbody>
</table>

3. (18 pts) The Java Language Documentation
   a) Access the Java API documentation from the class website. It is linked in the left hand sidebar.
   b) In the Java docs, look in the top left corner of the page for a list of packages. For each package listed below, write down the first sentence of the package description, and the name of the first class.
     - Example:
       java.awt.color: Provides classes for color spaces.
        First class: ColorSpace

     - java.math
       Provides classes for performing arbitrary-precision integer arithmetic (BigInteger) and arbitrary-precision decimal arithmetic (BigDecimal).
        First 3 classes: BigDecimal, BigInteger, MathContext

     - java.io
Provides for system input and output through data streams, serialization and the file system.
First 3 Classes: BufferedInputStream, BufferedOutputStream, BufferedReader

4. (40 pts) Question3 Program: Write a Java program that reads in two double typed numbers: Radius1 and radius2, and then obtains the volume of a geometric figure known as Torus (see image). The volume of a torus is calculated with the following formula: $Volume = 2\pi^2 Radius1 * radius2$
Approximate Pi to 3.141592.
Name your program Question4.

```java
import java.util.Scanner;

public class Question4{
    public static void main(String[] args){
        //Declare variables
        final PI = 3.141592;
        double Radius1, radius2;
        double Volume;
        Scanner in = new Scanner(System.in);

        //Prompt for values
        System.out.println("Please provide Radius1: ");
        Radius1 = in.nextDouble();
        System.out.println("Please provide a radius2: ");
        radius2 = in.nextDouble();

        //Calculate the volume
        Volume = 2 * PI * Radius1 * radius2;

        //Print the result
        System.out.println("The volume of the Torus is "+Volume);
    }
}
```
5. (+5 extra) Suppose you are very hungry and there is a very tasty looking cheesecake on a table in front of you (let’s also suppose you like cheesecake). However, there is a chance that the cheesecake is poisoned. There are also two persons next to the table. One of them always says the truth and the other one always lies, but you don’t know which is which. You are allowed to ask one and only one yes or no question to one of them to determine if you can eat the cheesecake or not. What question would you ask? Explain your reasoning.

Ask any of them: “If I asked the other person if it is OK to eat the cheesecake, would she say yes?”