The annotations here are just for myself to keep track of what I'm doing

CS 170 Lab 1: Program Execution

1. On your computer, look at the size of your primary and secondary storage. Below gives general instructions for Mac and Windows machines; depending on your version of operating system and settings the information might be in a slightly different location.
   MacOS: Select the Apple icon and then About This Mac. The memory (RAM) is listed on this screen. Select the Storage tab to see the size of secondary storage. Windows: Open Control Panel, select System and Security, and select System. Look for "Installed RAM" to see the size of your primary memory. Find the size of secondary storage at File Explorer and selecting This PC from the left sidebar.

   RAM size: 7.3 GiB
   Secondary storage size: 108.2 GiB

2. Which (RAM or secondary storage) is larger? Why does this make sense?
   Secondary storage is larger. It makes sense that RAM has less storage because RAM only holds programs and data that are currently being used in the processor, so nothing that's kept there is kept permanently. Since data needs to be stored somewhere permanently (note that data is copied to main memory when it is being used), secondary stirage is used for this purpose. Since secondary storage is where data is kept long-term and RAM only keeps data currently being used, secondary storage needs to be larger.

3. Give an example of something currently in secondary storage on your computer.
   TypesVariables.java

4. Give an example of something currently in RAM on your computer. On MacOS, you can see what is using memory in the Activity Monitor. On Windows, this information is found in Resource Monitor.
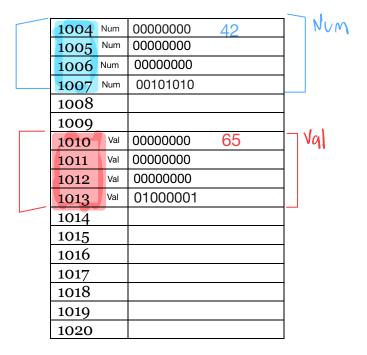   plasmashell

5. Consider the following line of Java code: `int num = 42;`
   When executed, what is the value stored in memory at the location associated with the variable num? You can use the decimal to binary converter here: https://www.rapidtables.com/convert/number/decimal-to-binary.html.
   00101010 (rapidtables gives 101010 but since memory addresses store bytes it should be in the form of 8 bits)

6. Suppose at the memory location associated with an int variable val you find the binary value 1000001. What is the value in decimal? You can use the converter from the previous question.
   65

7. Suppose the table below is part of the memory used by the program containing the variables num and val. If num is at address 1004, val is at address 1010, and int values take 4 bytes, show which memory addresses are occupied by these variables. Remember each memory address is a byte of data.

1000	
1001	
1002	
1003	

Address	Label	Binary	Value
1004	Num	00000000	42
1005	Num	00000000	
1006	Num	00000000	
1007	Num	00101010	
1008			
1009			
1010	Val	00000000	65
1011	Val	00000000	
1012	Val	00000000	
1013	Val	01000001	
1014			
1015			
1016			
1017			
1018			
1019			
1020			

(handwritten annotation: Num bracketing addresses 1004–1007; Val bracketing addresses 1010–1013)

8. Using IntelliJ or your IDE of choice, create a new source code file called `HelloLab.java`. Where is this file stored (RAM or secondary storage)?

The file will be stored in secondary storage but when you're using it (like editing), a copy will be in RAM. But the saved file itself is in secondary storage.

9. Add the following code to `HelloLab.java`:

```java
public class HelloLab {
    public static void main(String[] args) {
        int a = 10;
        int b = 20;
        int sum = a + b;
        System.out.println("The sum is: " + sum);
    }
}
```

Compile and execute this program. Compilation creates a new file with the compiled bytecodes. Locate this new file (following the setup here https://www.jetbrains.com/help/idea/creating-and-running-your-first-java-application.html# it will be in a folder named "out"). What is the name of this file?

HelloLab.class

10. What is the output of the `HelloLab` program?

The sum is: 30