CMSC 203 Lab 5
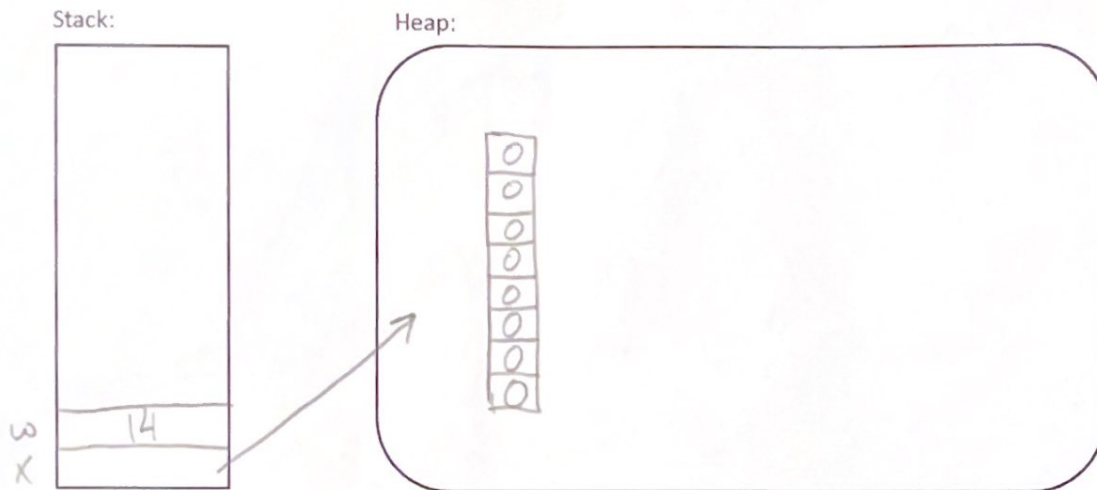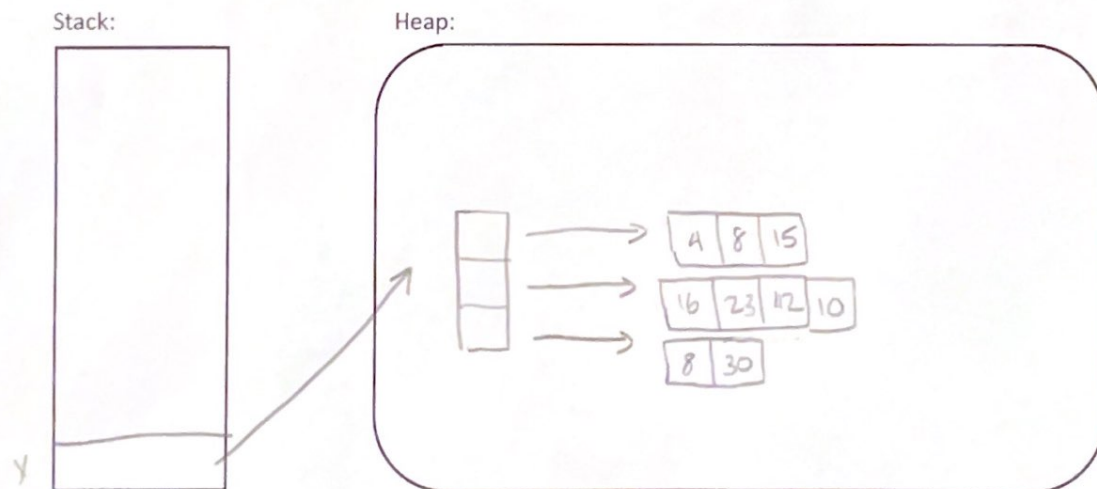# Memory Mapping

1. Draw the memory map of the following variable int w and one-dimensional array of type int.
   int w = 14;
   int [] x = new int [8];

Stack: Heap:

2. Draw the memory map of the following two-dimensional ragged array of ints.
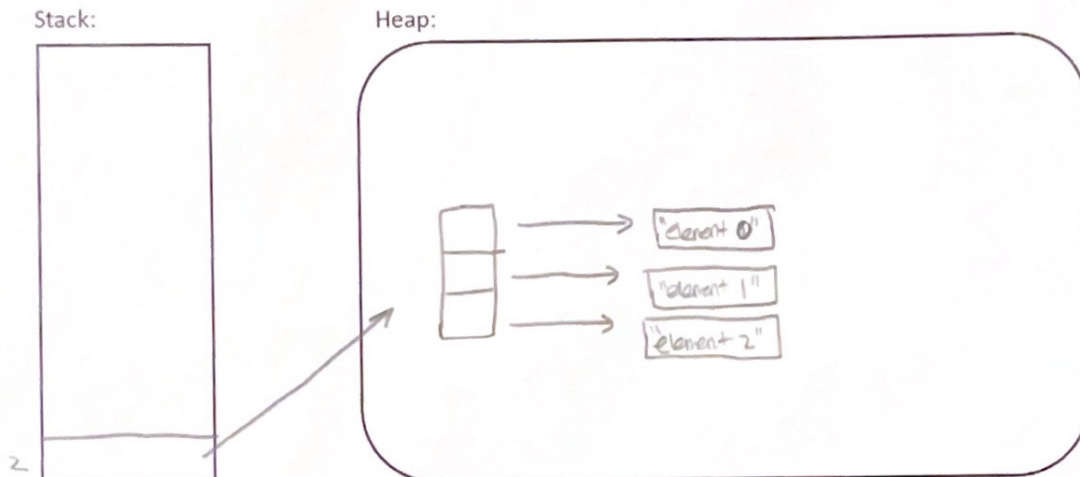
   int[][] y = {{4, 8, 15}, {16, 23, 42, 10}, {8, 30}};

Stack: Heap:

3. Draw the memory map of the following one-dimensional array of type String.

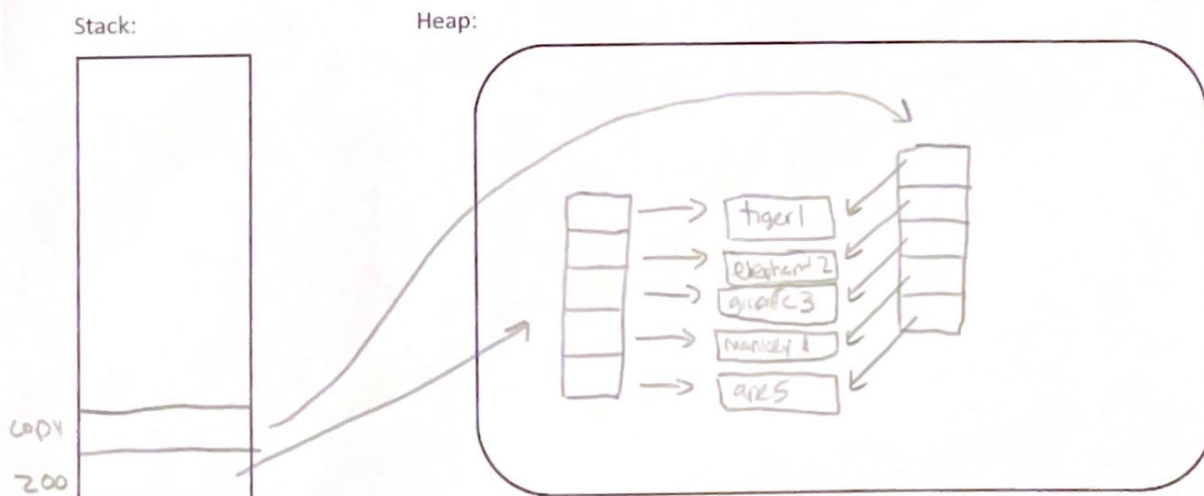3. Draw the memory map of the following one-dimensional array of type String.

   ```
   String[] z = new String[4];

   for (int i = 0; i < z.length; i++) {

       z[i] = "element " + i;

   }
   ```

Stack: Heap:

4. a. Write a shallow copy of the following in code. (Assume the five animal objects are already instantiated.)

   ```
   Animal[] zoo = {tiger1, elephant2, giraffe3, monkey4, ape5};
   Animal[] copy = new Animal[5];
   Animal[] copy = new Animal[zoo.length];
   for( int i=0; i < copy.length; i++)
       copy[i] = zoo[i];
   ```
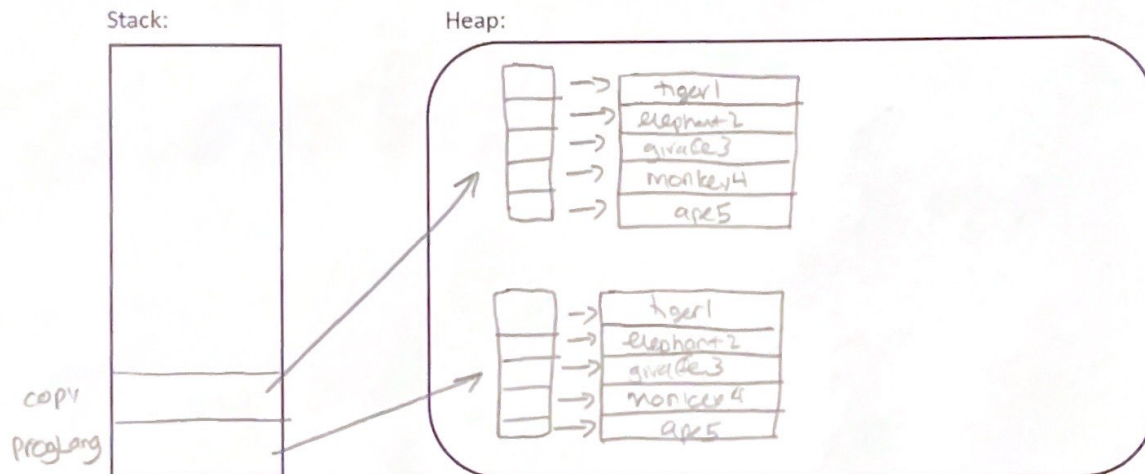
   b. Draw the memory map.

Stack: Heap:

5. a. Write the deep copy of the following in code.

Animal[] zoo = {tiger1, elephant2, giraffe3, monkey4, ape5};
Animal[] copy = new Animal[zoo.length]
for(int i=0; i<copy.length; i++)
    copy[i] = new Animal (zoo[i]);

b. Draw the memory map.

Stack: Heap:

6. What is garbage collection? Where does it happen?

garbage collection is where java programs perform auto memory management. It occurs when the system has low physical memory. It occurs in the JVM.

7. What is the difference between the two operators, equals() and ==?

== is used for address comparison while equals() is used to compare the content.

== is an operator while equals() is a method.