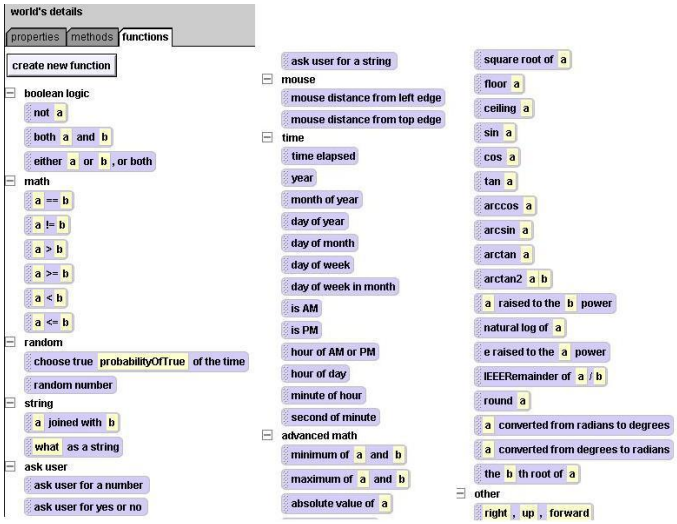
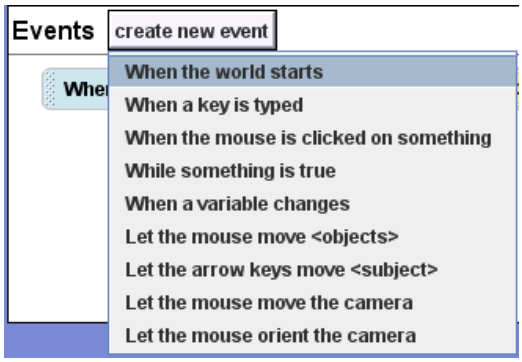
CompSci 4 - Test 2 – November 10, 2009

Given below are the world functions.



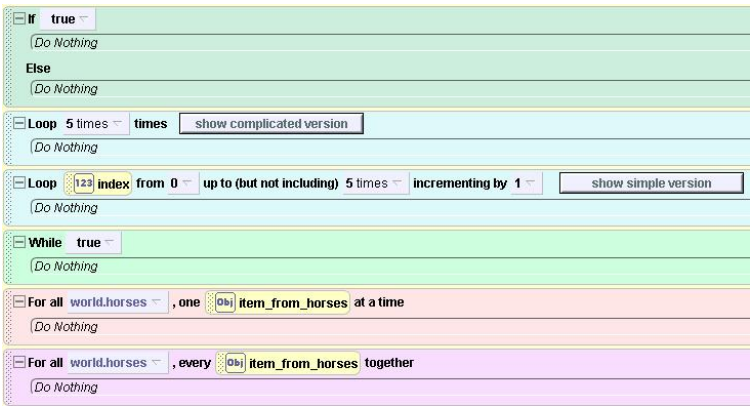
Tiles at the bottom of the Alice window.

Events:

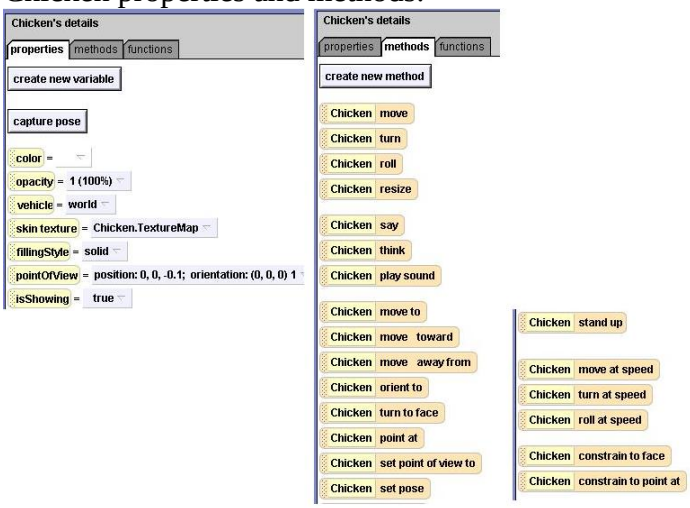


Not shown: When something is true

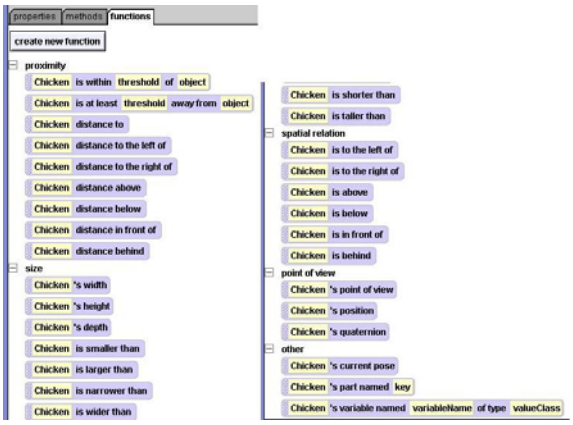
Format of instructions:



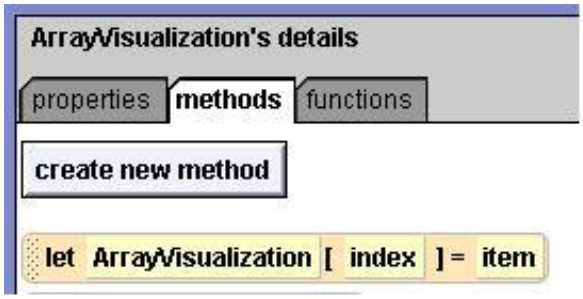
Chicken properties and methods:

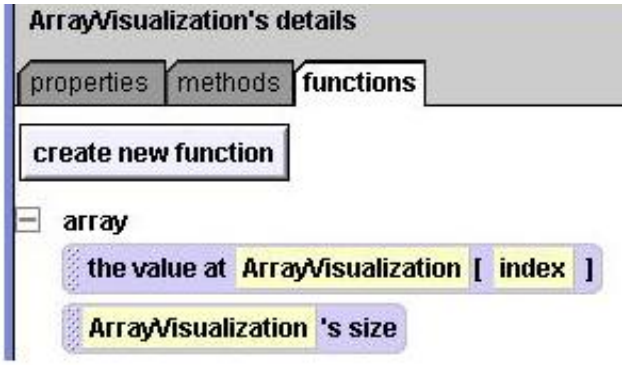


Given below are the chicken functions.

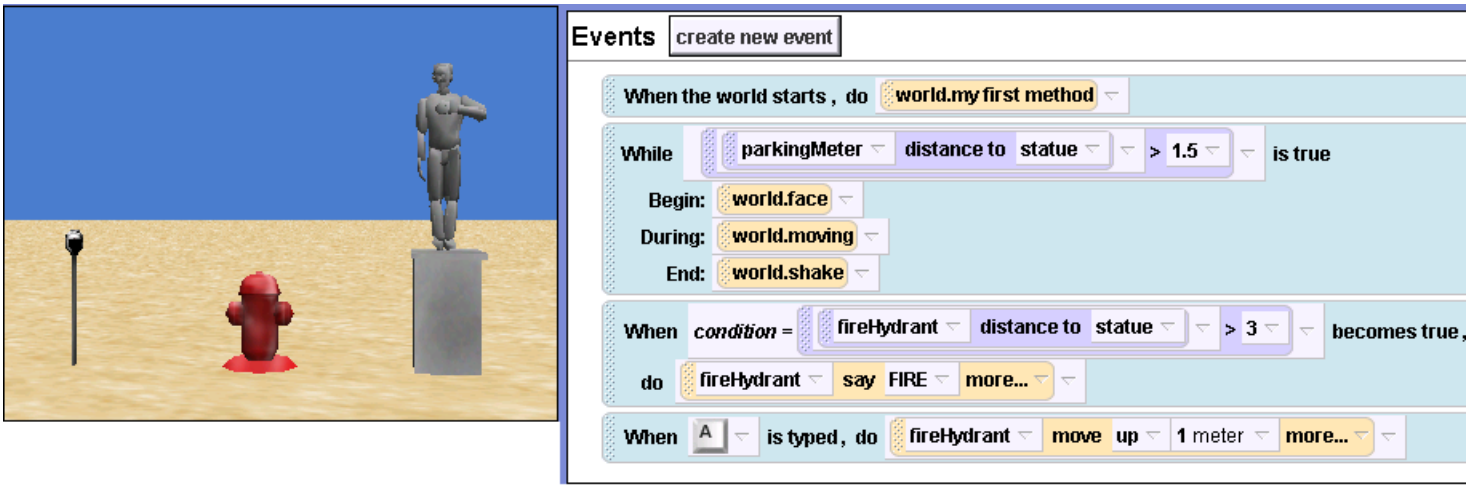


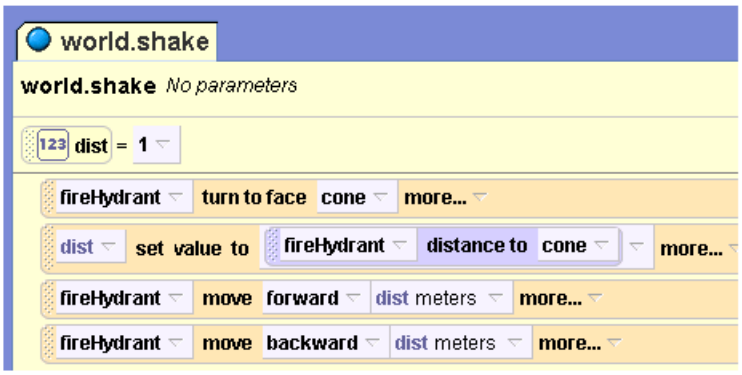
Array Visualization special methods and functions

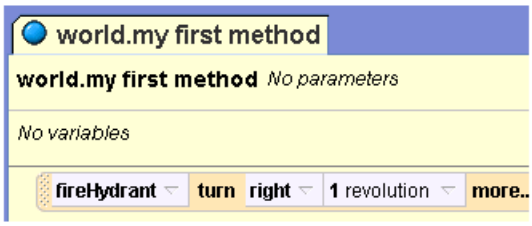


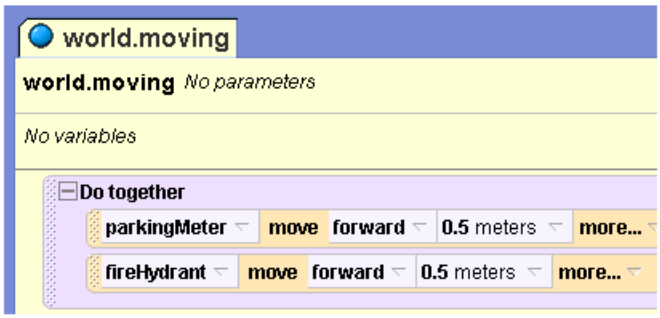


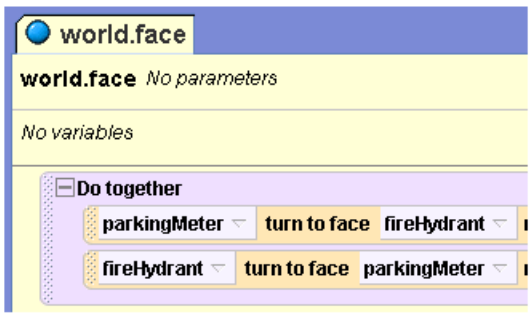
1. (12 pts) Consider the following snapshot of an Alice world in which there are three objects which are (from left to right) `parkingMeter`, `fireHydrant`, and `statue` and one invisible object `cone`. The cone is in the same position as the fire hydrant. The parkingMeter and fireHydrant are 2 meters apart. The fireHydrant and statue are 2 meters apart. Imagine the four of them are standing on an invisible line.





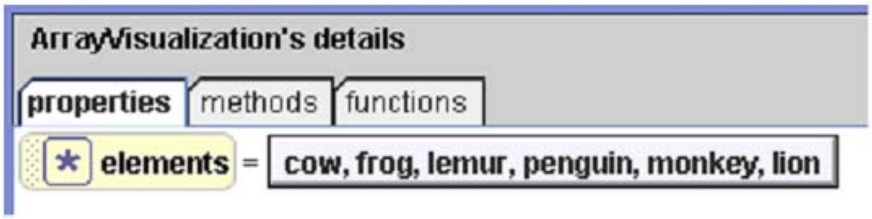




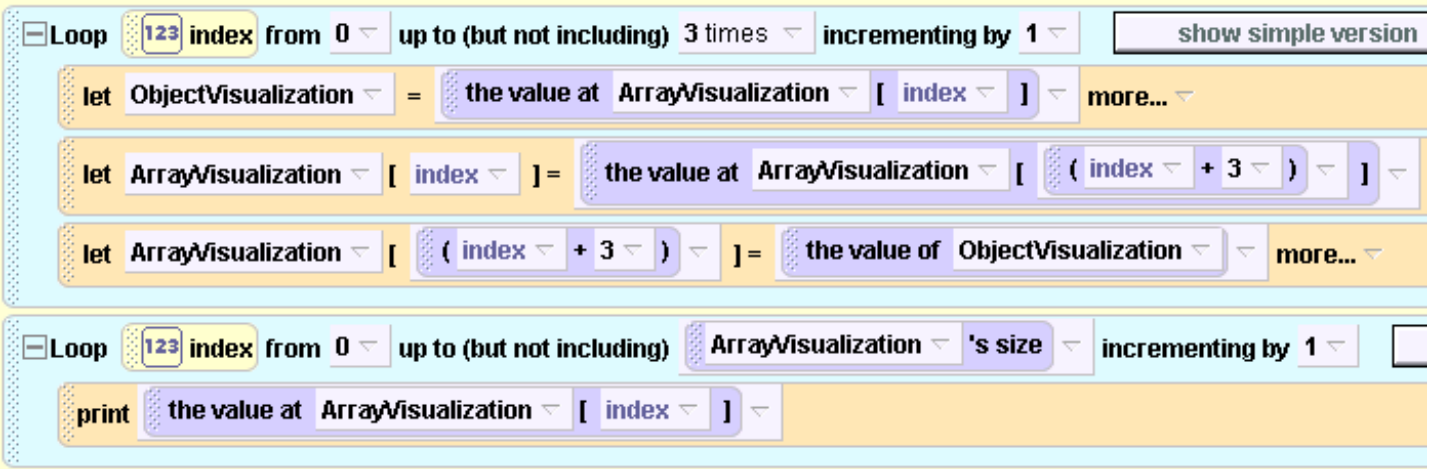


A) List the events in this world.
B) List the event handlers in this world.
C) Explain what happens in the world when the Play button is pressed.
D) After the Play button is pressed, explain how the user can make the fireHydrant go out of view.

2. (4 pts) Consider the following array of animals shown below as a picture and as a property, and the following code. Also shown in the picture are an ArrayVisualization and an ObjectVisualization.



Here is the code:



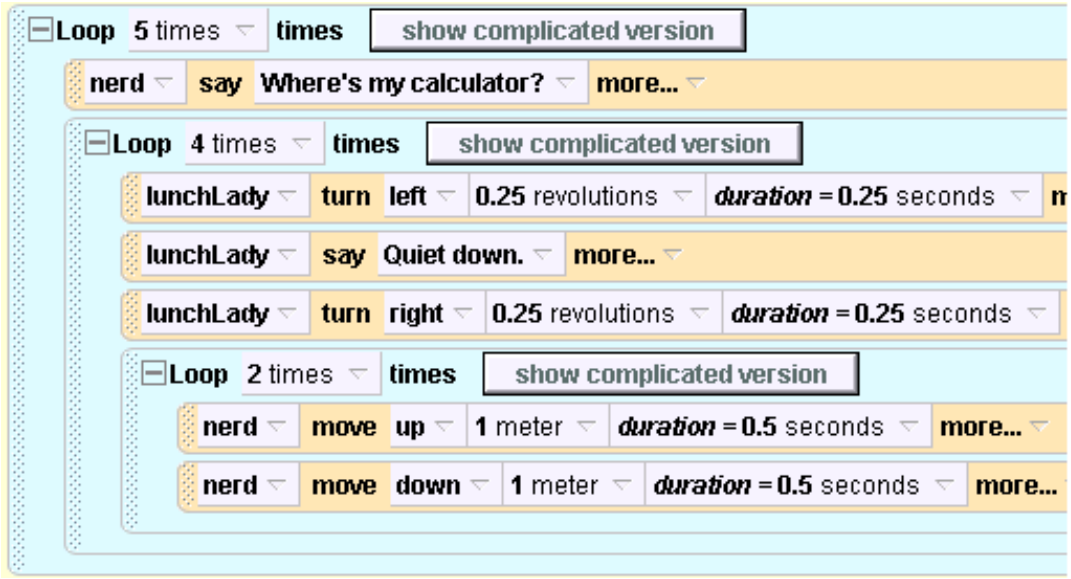
Remember that when an object is printed, its name is printed.
What output is printed when this code is executed?

3. (7 pts) Consider the following function called `world.mystery`. Assume a list called *creatures* has been created and filled with objects.

```
world.mystery
world.mystery (value)
animal = <None>
    animal set value to stool
    For all world.creatures, one item_from_creatures at a time
        If item_from_creatures distance to stool < value
            animal set value to item_from_creatures
        Else
            Do Nothing
    Return animal
```

A. What type of value does the function `world.mystery` return?
B. What is `animal`: a local variable, a class variable or a parameter?
C. Explain what the function `world.mystery` does.

4. (6 pts) Consider the following Alice code.



A. How many times does the lunchLady say “Quiet down when this code executes?

B. How many times does the nerd jump up and down when this code executes?

C. How many times does the nerd say “Where’s my calculator?” when this code executes?

5. (7 pts) Consider the following recursive function world.mystery whose lines are numbered.

```
world.mystery
world.mystery (value)
No variables
1  If (value <= 4)
2      Return (value + 2)
3  Else
4      Return (1 + (world.mystery value = (value - 5)))
5  Return 2
```

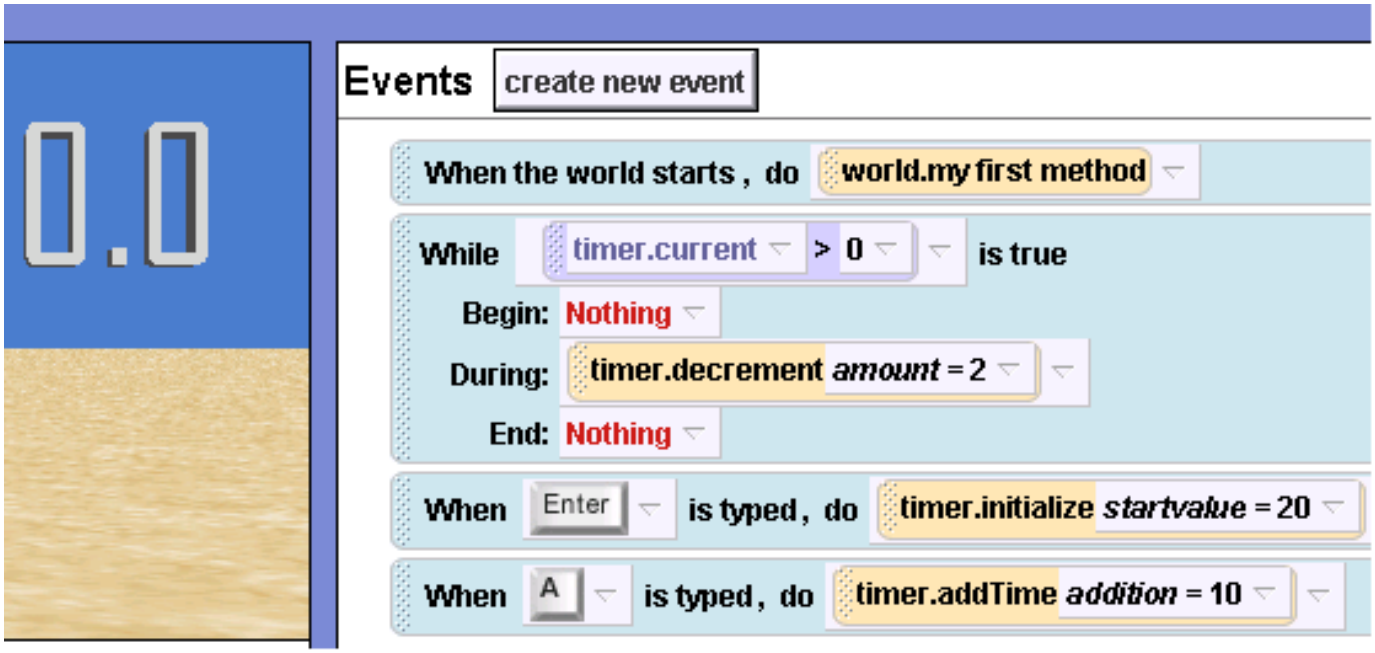
A. Which line of code has recursion?

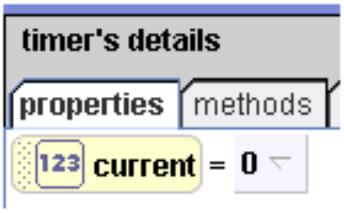
B. Explain where the "way out" of the recursion is.

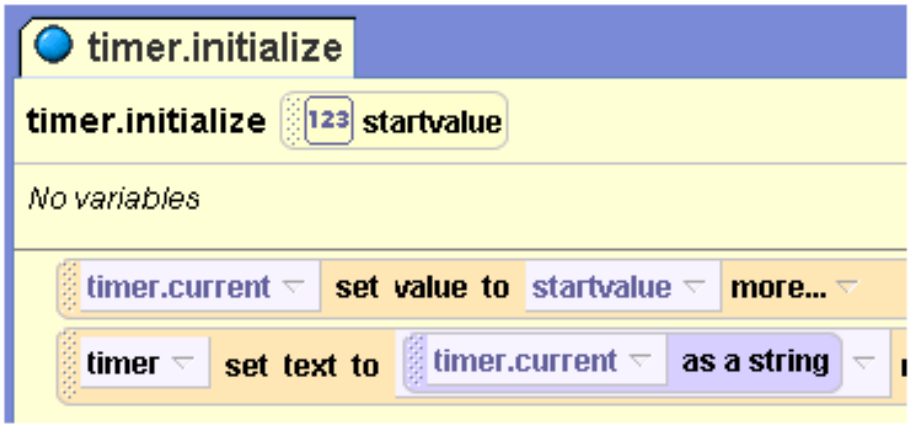
C. What is the output of the following code?

```
print (world.mystery value = 5)
print (world.mystery value = 2)
print (world.mystery value = 13)
```

6. (10 pts) Consider the following Alice world, which includes a timer and several events to control the timer. The method timer.initialize is shown and executed when the user presses Enter.







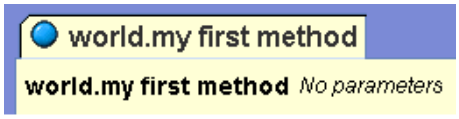
Complete the methods on the next page.

A. Write the method timer.decrement that has one integer parameter named *amount*. The timer is decremented by *amount* and the new value is displayed.

B. Write the method timer.addTime that has one integer parameter named *addition*. When this method executes, the extra time *addition* is added to the current value of time and the new time is displayed.

7. (8 pts) Consider the following Alice world with a male named DJ holding a baseball glove in his left hand (that is glued to his hand), a baseball high in the air directly above DJ and a pterodactyl flying around.

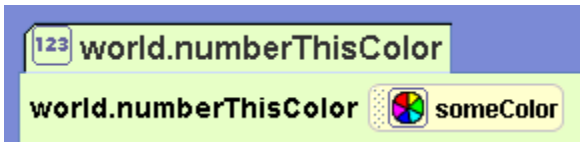
Give the Alice code that does the following. Repeatedly, the baseball falls 0.1 meter and at the same time DJ moves up 0.1m. This continuously happens until the baseball is close to the baseball glove (within .2 meters) or something else grabs the baseball. (Note that if something else grabs the baseball, then the baseball's vehicle property would no longer be set to the world.) Make sure to have DJ come back down to the ground after catching the baseball. He should also come back down to the ground if something else gets the baseball. (THIS IS NOT AN EVENT). Write this code in world.myFirstMethod (Note: you are not writing the code for something else to grab the baseball, just be aware that if the baseball's vehicle property is no longer equal to the world, then DJ cannot catch the baseball, something else has it)



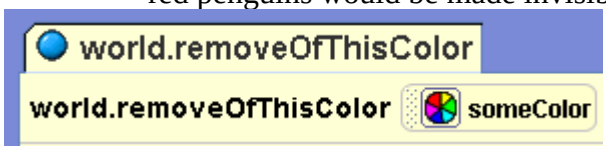
8. (20 pts) Assume all the penguins below are in a list called `penguins`. Note that some of the penquins are red in color (look shaded), the rest are white

A. Write the function `world.numberThisColor` with one parameter: someColor. This function returns the number of penguins in the list that are

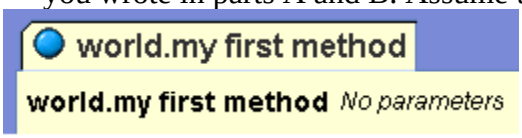
of the color someColor. For example, in the picture above, world.numberThisColor with someColor == RED would return 4.



B. Write the method `world.removeOfThisColor` that has one parameter someColor. This method makes all the penguins in the list with this color invisible. For example, if the call world.removeOfThisColor with someColor == RED on the list of penguins at the beginning of this problem, then the four red penguins would be made invisible.

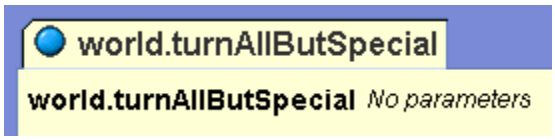


C. Complete the code in myFirstMethod to do the following. Assume all penguins are of the color red or of the color white. If there is a minority number of penguins of one such color, then turn invisible all the penquins of the minority color. For example, in the earlier picture of the penguins there were 4 red penguins and 6 white penguins. In this case the four red penguins would turn invisible. For full credit you must call the function and method you wrote in parts A and B. Assume they work correctly.



9. (16 pts) Consider the arrayVisualization of people shown below.

A) Write the function `World.turnAllButSpecial` that has each person in the array turn around once, in place except for one random person who says “I can’t move” instead of turning around. You must determine the random person.



B) Write the function `world.Tallest` that returns the tallest person in the array. Assume there are at least two people in the array.