

CompSci 94

Variables and Array Indexing

October 26, 2021



Prof. Susan Rodger

Announcements

- Assignment 4 due Thursday Oct 28
- Videos and online quiz for next class

Pig and Panda arrays

- Two arrays, animals are in the arrays from left to right as seen



unmanaged

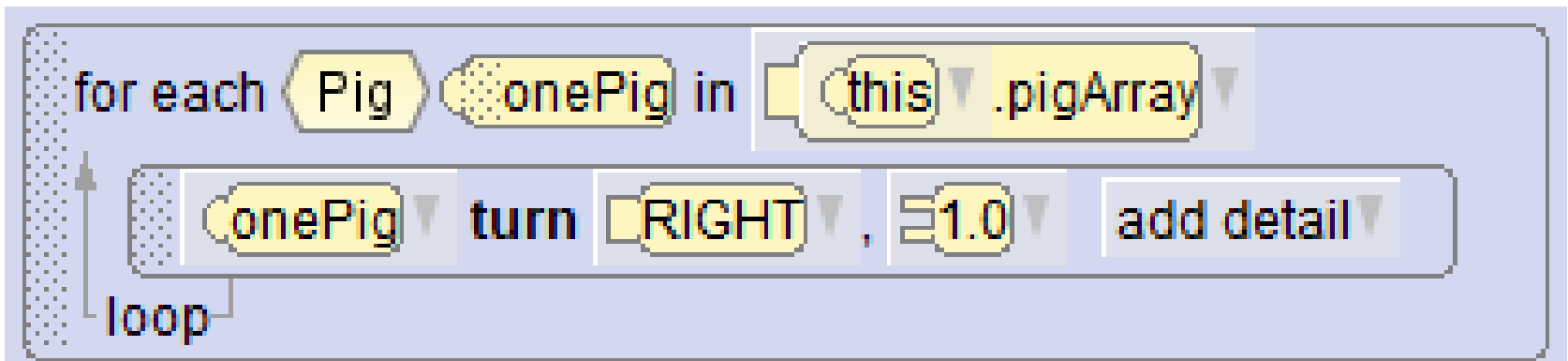
```
▼ Pig[] pigArray ← new Pig[] { this.pig, this.pig2, this.pig3, this.pig4 }
▼ Panda[] pandaArray ← new Panda[] { this.panda, this.panda2, this.panda3, this.panda4 }
```

Review1 - What is the code for?

- Code for Pigs to turn right one pig at a time?

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- Code for Pigs to turn right one pig at a time?
 - Use a “for each in” loop
 - Name a loop variable – I chose **onePig**



Review2 – What is the code for?

- Code for Pandas to bow **at the same time** (turn forward a little, then turn backward)?

Review2 – What is the code for?

- Code for Pandas to bow **at the same time** (turn forward a little, then turn backward)?
 - Use “each in together” loop
 - Name a loop variable – I chose **onePanda**

```
each Panda onePanda in this.pandaArray together
  onePanda turn FORWARD , 0.125 add detail
  onePanda turn BACKWARD , 0.125 add detail
```

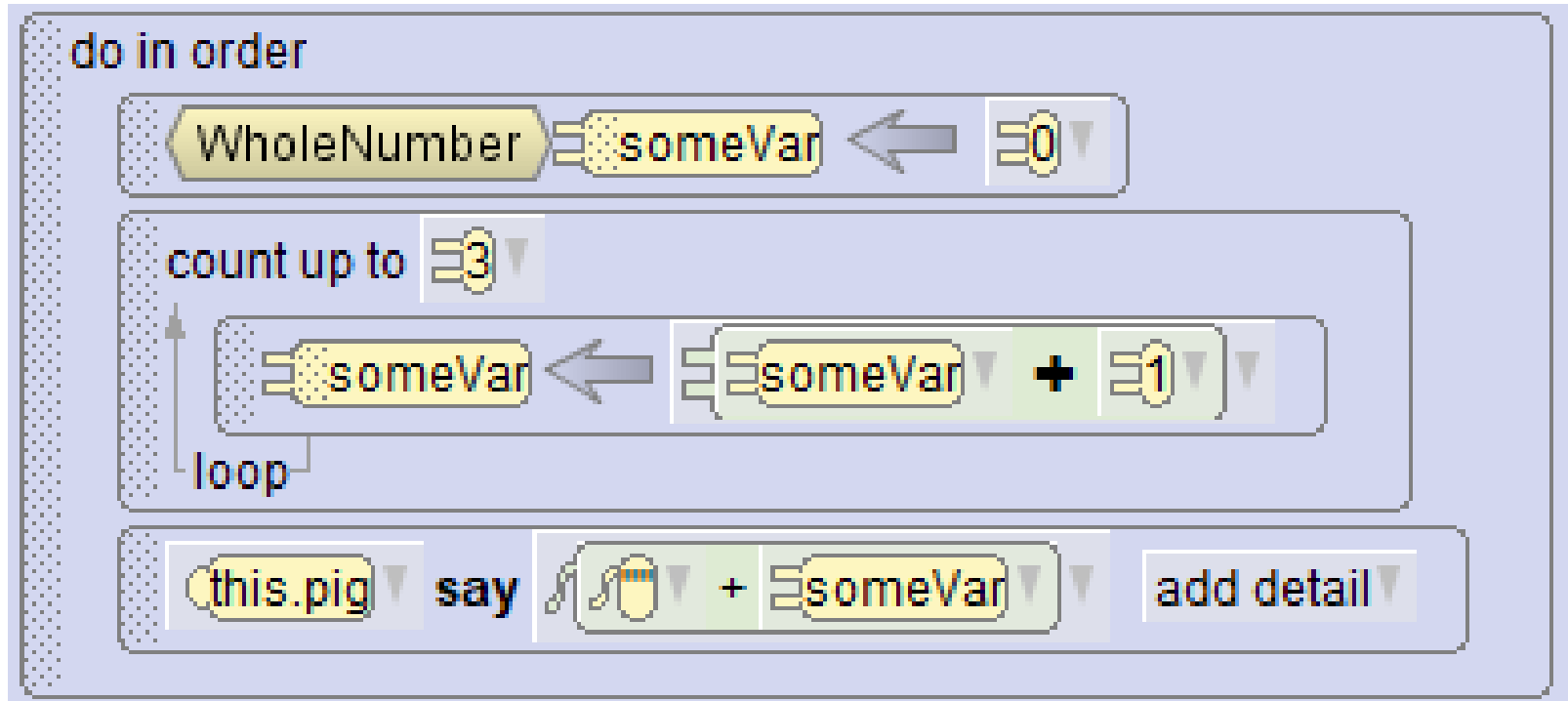
Q1 – Questions about variables

- What is the difference between a const variable and a variable?
- Which Alice construct do you use to change a variable?

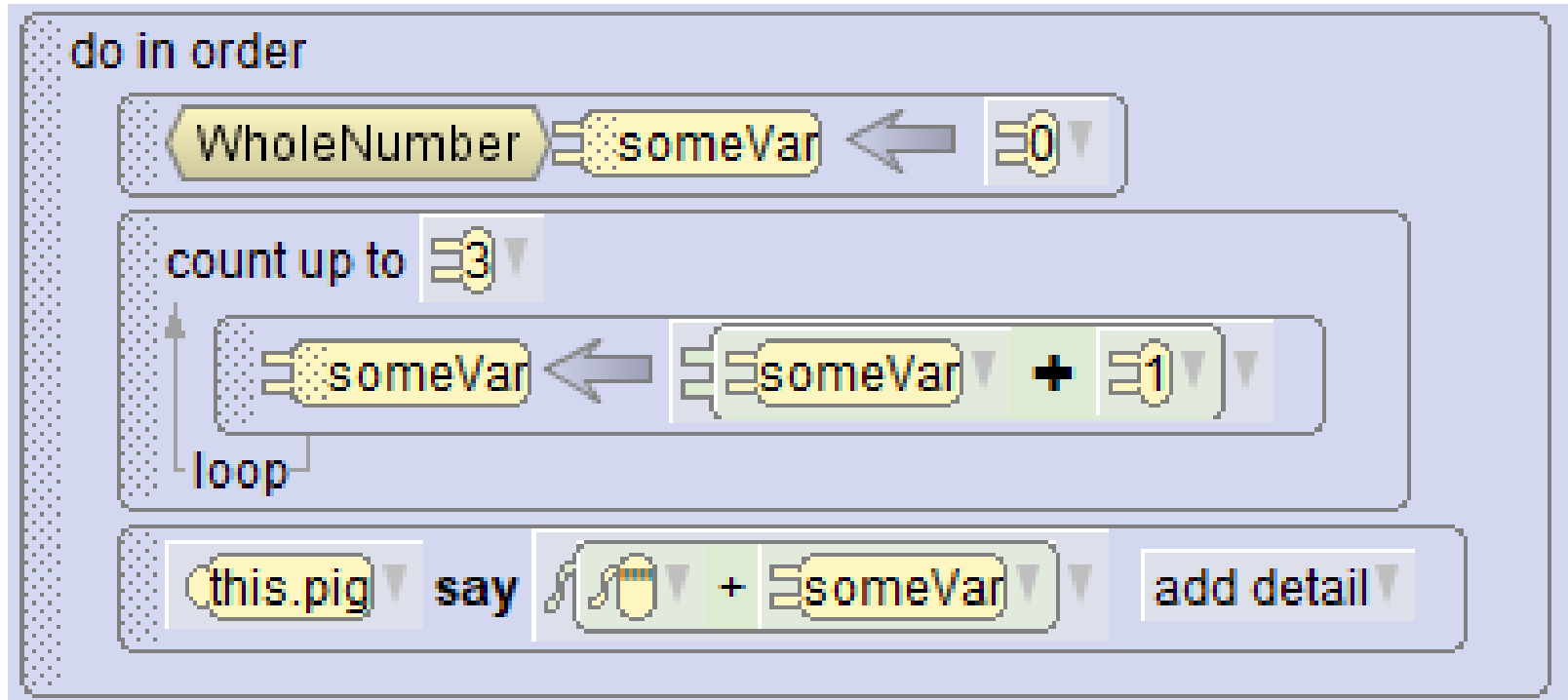
Q1 – Questions about variables

- What is the difference between a const variable and a variable?
 - Const variable can only store one value when it is created
 - Variable can store a value that can change
- Which Alice construct do you use to change a variable?
 - Assign tile

Q2 - What is the output of this code?



Q2 - What is the output of this code?



- Pig says: 3

The image shows a Scratch script with the following blocks:

- do in order** (loop container)
- WholeNumber** block with `someNum` and value `0`.
- count up to** block with value `3`.
- loop** block containing:
 - `someNum` block with a left arrow.
 - +** block with `someNum` and value `1`.
- this.pig4** **say** block with a pig icon and value `1`.

A dropdown menu is open for the `someNum` variable in the `+` block. The menu items are:

- `1` (current value)
- `0`
- `1`
- `2`
- `3`
- Random
- Decimal to Whole Number
- Math
- Custom WholeNumber...
- array length:
 - `this.pigArray.length`
 - `this.pandaArray.length`
- TextString
- DecimalNumber
- SThing

Q3 -- Consider this code.
 Why isn't somenum a
 choice?

The image shows a Scratch code editor with the following elements:

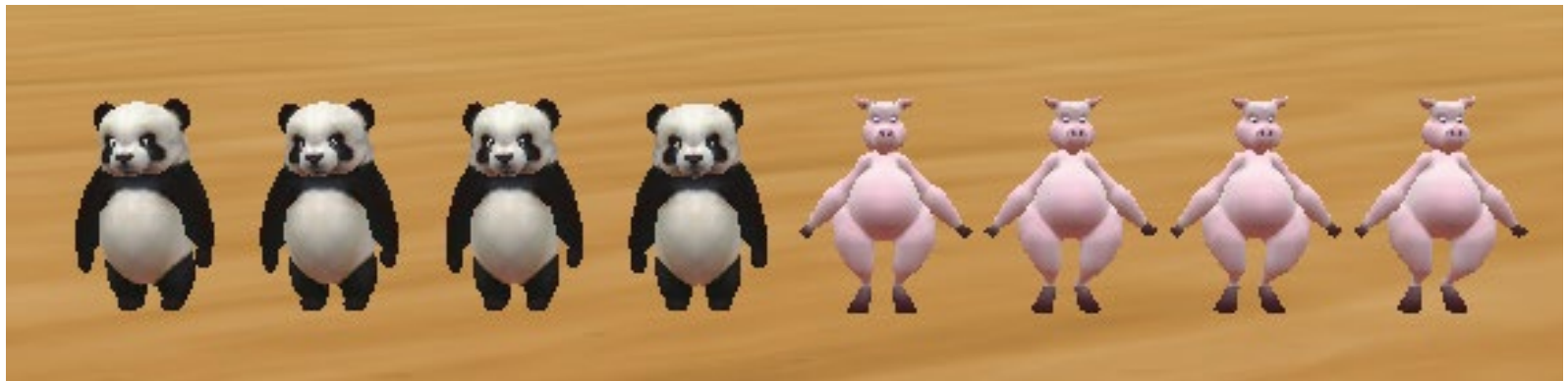
- A **do in order** loop containing:
 - A **WholeNumber** block with `someNum` and a value of `0`.
 - A **count up to** block with a value of `3`.
 - A **loop** block containing:
 - A **someNum** block with a value of `someNum`.
 - A **+** block with a value of `1`.
- A **say** block with `this.pig4` and a **+** block with a value of `1`.
- A dropdown menu is open, showing a list of variables:
 - `1 (current value)`
 - `0`
 - `1`
 - `2`
 - `3`
 - Random
 - Decimal to Whole Number
 - Math
 - Custom WholeNumber...
 - array length:*
 - `this.pigArray.length`
 - `this.pandaArray.length`
 - TextString
 - DecimalNumber
 - SThing

Q3 – Consider this code.
Why isn't somenum a choice?

- It is not in scope! It is not in the do in order!

Pig and Panda arrays again

- Two arrays, animals are in the arrays from left to right as seen



unmanaged



Pig[]

pigArray



```
new Pig[] { this.pig, this.pig2, this.pig3, this.pig4 }
```



Panda[]

pandaArray



```
new Panda[] { this.panda, this.panda2, this.panda3, this.panda4 }
```

Q4 – How do I write an **array index loop** to have each pig turn right once?

- *Fill in the missing code:*

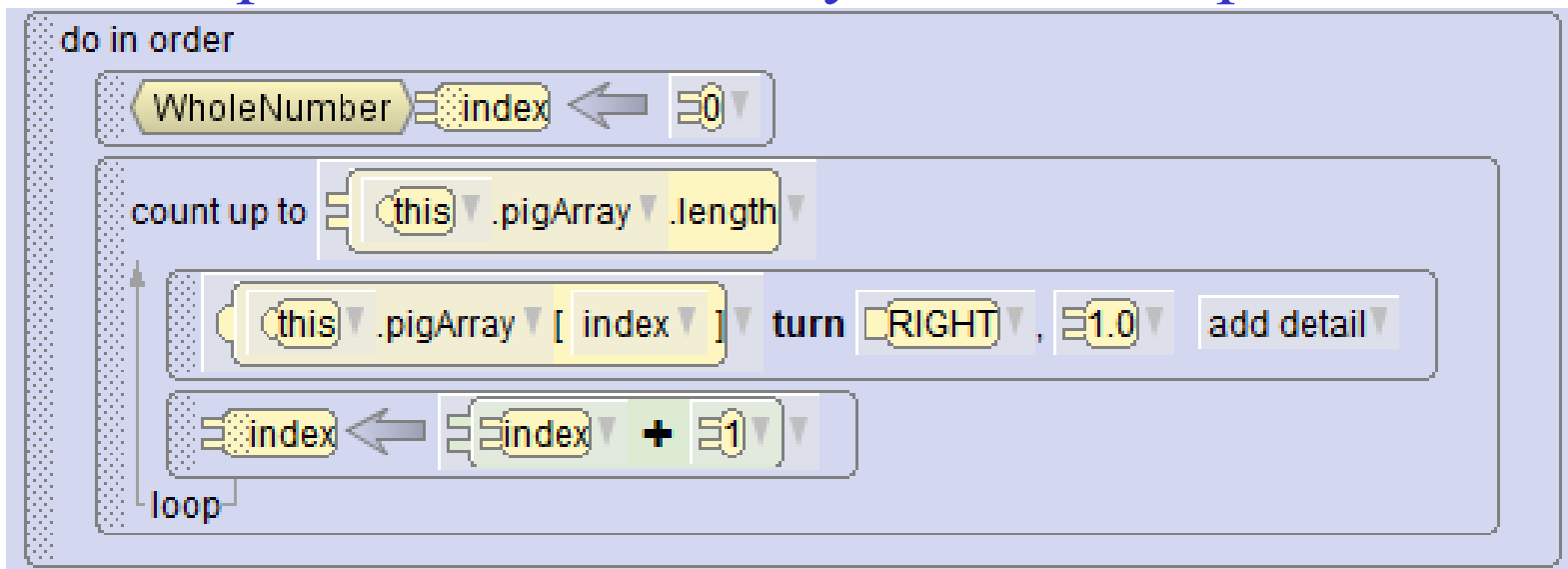
The image shows a Scratch code editor with a 'do in order' loop. The loop contains two blocks:

- A 'WholeNumber' block with 'index' in the input field and '0' in the dropdown menu. An arrow points from the 'index' field to the '0' dropdown.
- A 'count up to' block with 'this' in the dropdown, '.pigArray' in the input field, and '.length' in the dropdown.

The loop is labeled 'loop' at the bottom left corner.

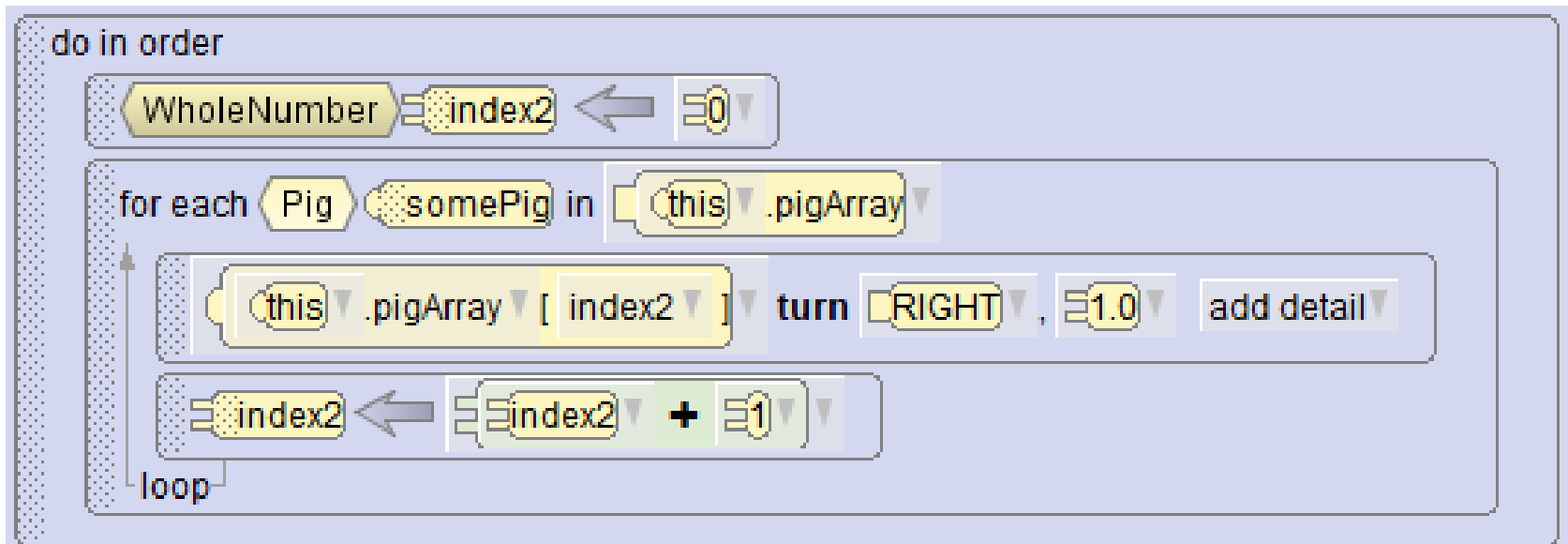
Q4 – How do I write an **array index loop** to have each pig turn right once?

- **Use a count loop**
 - Create a variable set to 0
 - Use the variable to index in the array
 - Update the variable by 1 in the loop



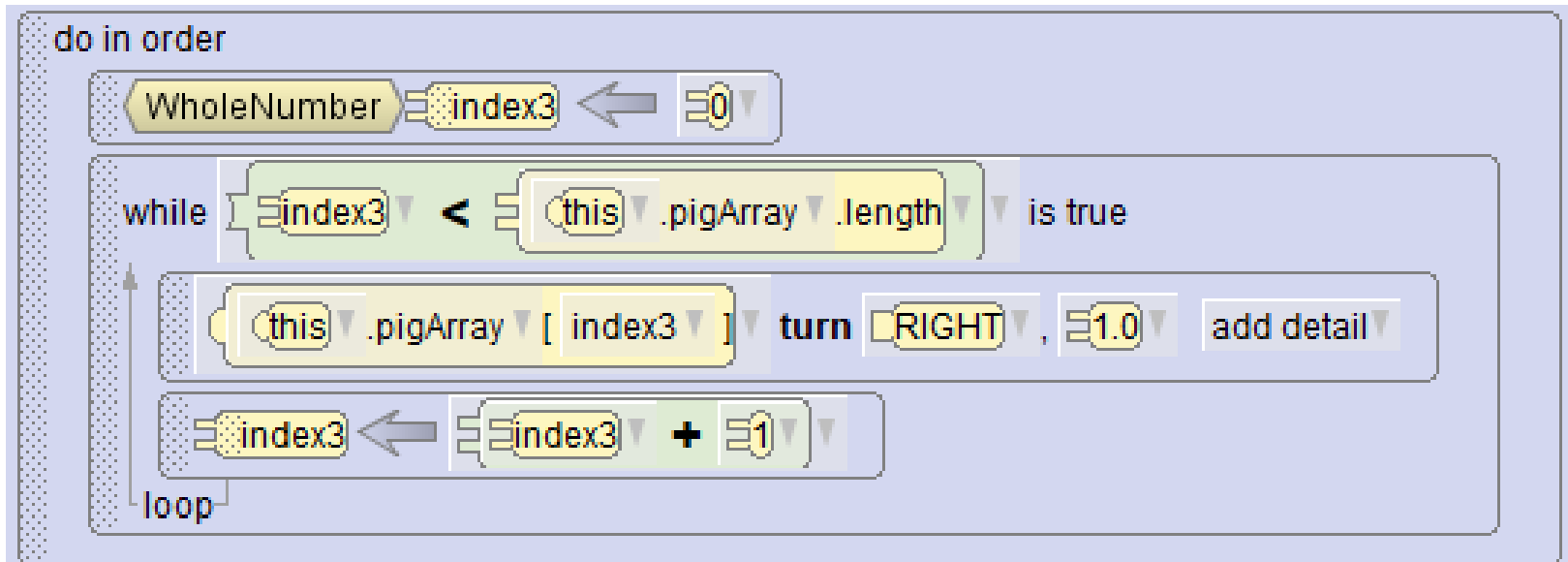
Q4 – How do I write an **array index loop** to have each pig turn right once?

- **Or could use a for each in loop**
 - Create a variable set to 0
 - Use the variable to index in the array
 - Update the variable by 1 in the loop



Q4 – How do I write an **array index loop** to have each pig turn right once?

- **OR could use a while loop**
 - Create a variable set to 0
 - Use the variable to index in the array
 - Update the variable by 1 in the loop



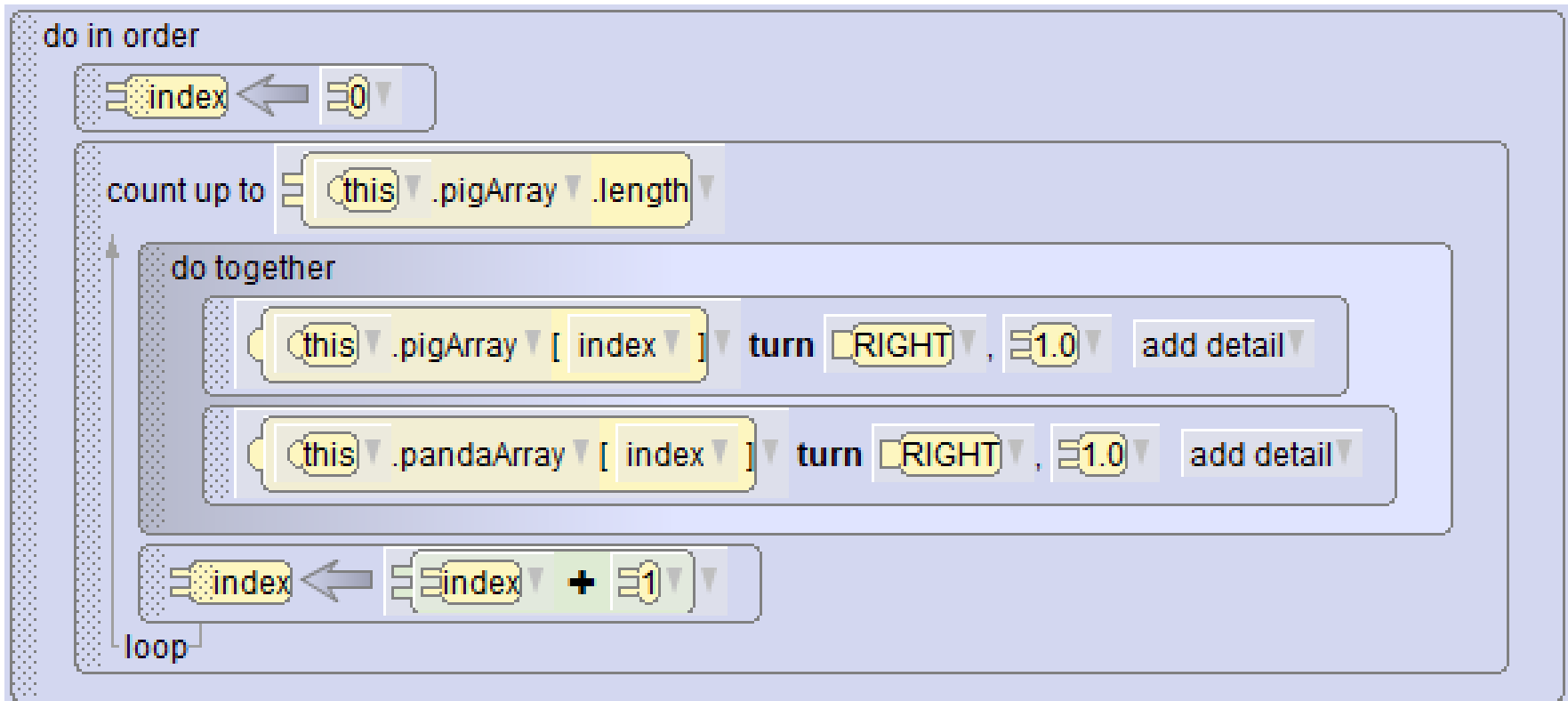
Q5 – How do I write code to have each pig turn right once one at a time, with one of the pandas turning with each pig?

- *Fill in missing code:*

The image shows a Scratch 'do in order' loop block. The block is titled 'do in order' and contains a 'loop' label at the bottom left. The loop body is a large white rectangle. Above the loop body, there is a 'count up to' block with 'this.pigArray.length' as the value. Below the loop body, there is an 'index' block with a left-pointing arrow and a value of '0'. At the bottom of the loop body, there is an 'index' block with a left-pointing arrow, a plus sign, and a value of '1'. The 'index' block at the bottom is connected to the 'index' block above it by a vertical line. The 'index' block at the top is connected to the 'index' block at the bottom by a vertical line.

Q5 – How do I write code to have each pig turn right once one at a time, with one of the pandas turning with each pig?

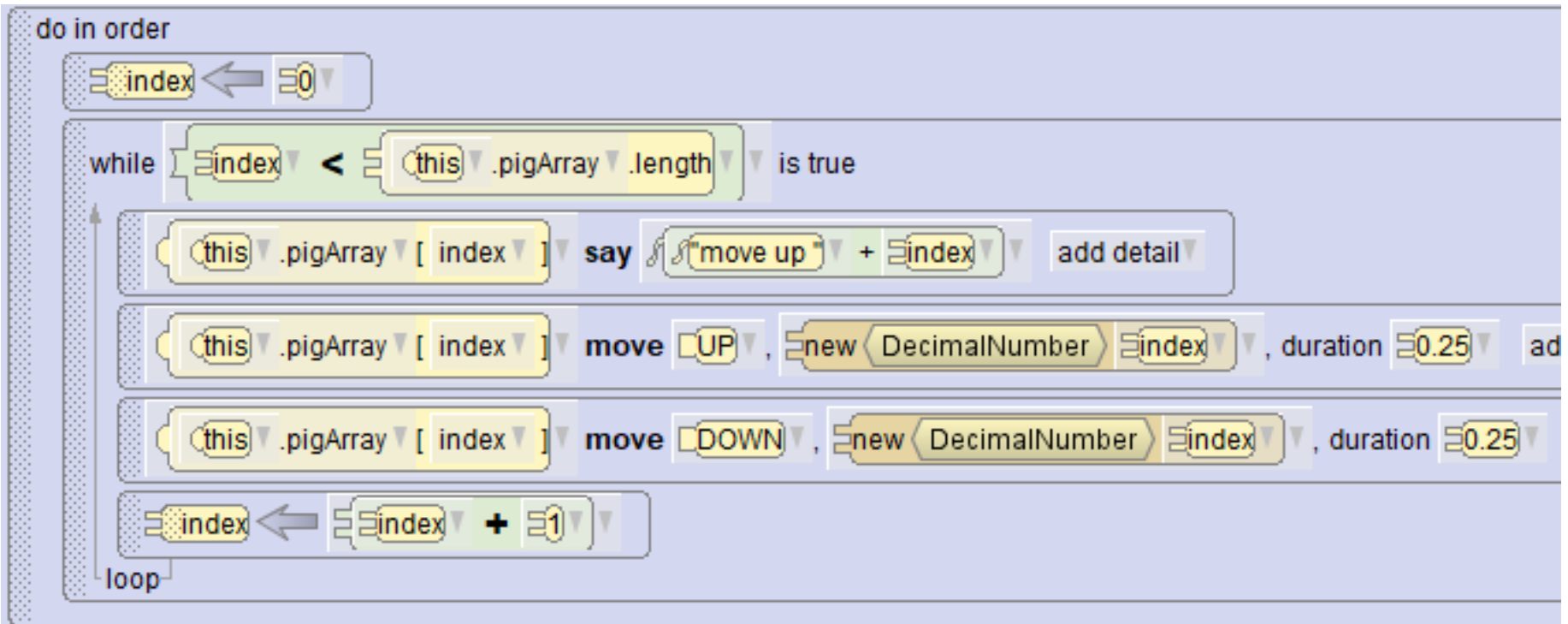
- Use any type of array index loop



Q5 continued

- Notice the pigs and pandas arrays must be the same size for this to work!

Q6 – What does this code do?



Q6 – What does this code do?

- each pig moves up and down one at a time with the next pig moving one unit more. That is, the first pig 0 units, second pig 1 unit, third pig 2 units, etc.

The image shows a Scratch script for a pig movement simulation. The script is enclosed in a "do in order" container. It starts with an "index" variable set to 0. A "while" loop condition is "index < this.pigArray.length". Inside the loop, there are four blocks: 1) A "say" block where the pig at the current index says "move up" + the index value, with "add detail" checked. 2) A "move" block where the pig moves UP by a new DecimalNumber of the index value, with a duration of 0.25. 3) A "move" block where the pig moves DOWN by a new DecimalNumber of the index value, with a duration of 0.25. 4) An "index" block where the index is incremented by 1. The loop is labeled "loop" at the bottom left.

```
do in order
  index ← 0
  while (index < this.pigArray.length) is true
    this.pigArray[index] say "move up" + index add detail
    this.pigArray[index] move UP, new DecimalNumber index, duration 0.25
    this.pigArray[index] move DOWN, new DecimalNumber index, duration 0.25
    index ← index + 1
  loop
```

Q6 – What does this code do?

- NOTE: Use an array index loop in two places
 - One for index, one for how far to move up/down

The image shows a Scratch code editor with the following blocks:

- do in order** block containing:
 - index** ← 0
 - while** loop with condition: `index < this.pigArray.length` is true
 - `this.pigArray[index]` say "move up" + index add detail
 - `this.pigArray[index]` move UP, new DecimalNumber index, duration 0.25
 - `this.pigArray[index]` move DOWN, new DecimalNumber index, duration 0.25
 - index** ← index + 1

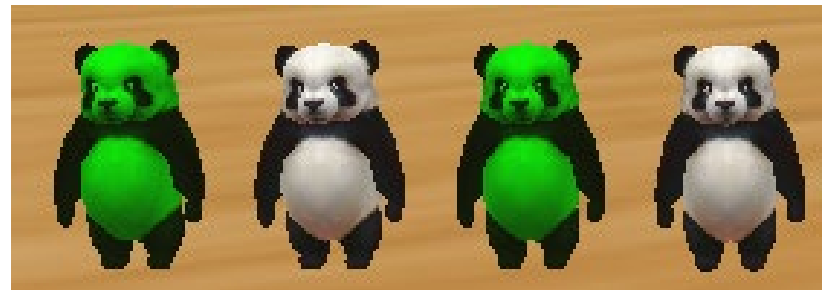
The word "loop" is written at the bottom left of the code area.

Q7 – How do you write code to color every other panda green in array?

- Start with no color

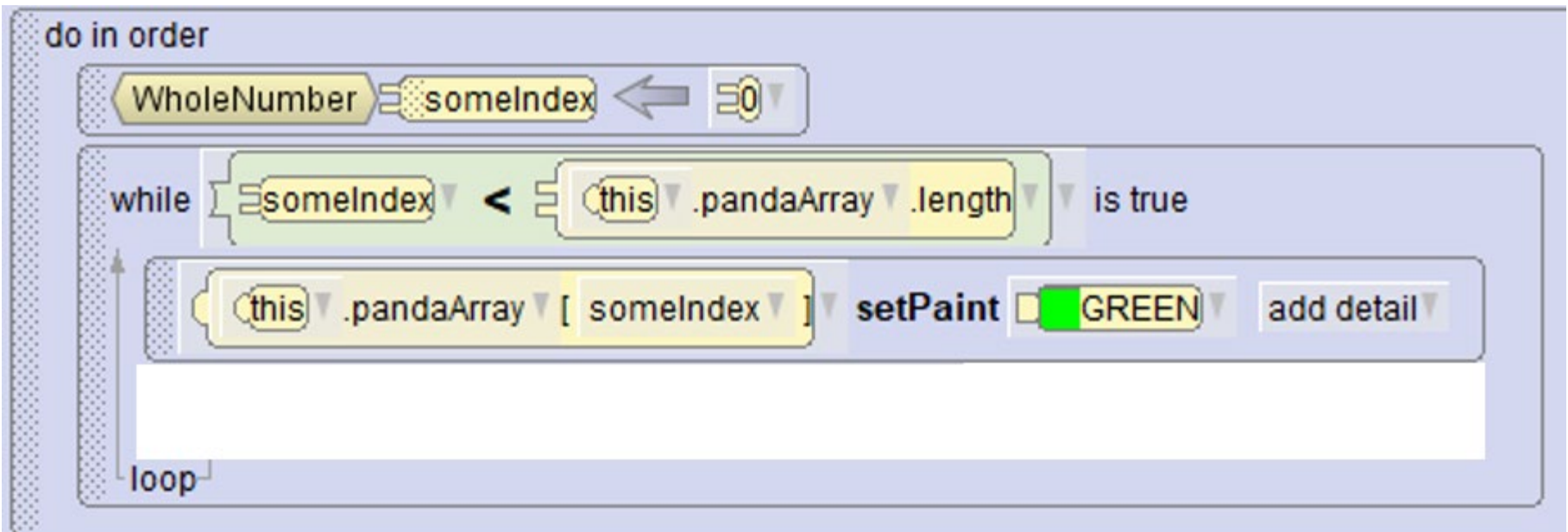


- Color every other green (1st one, 3rd one, etc.)



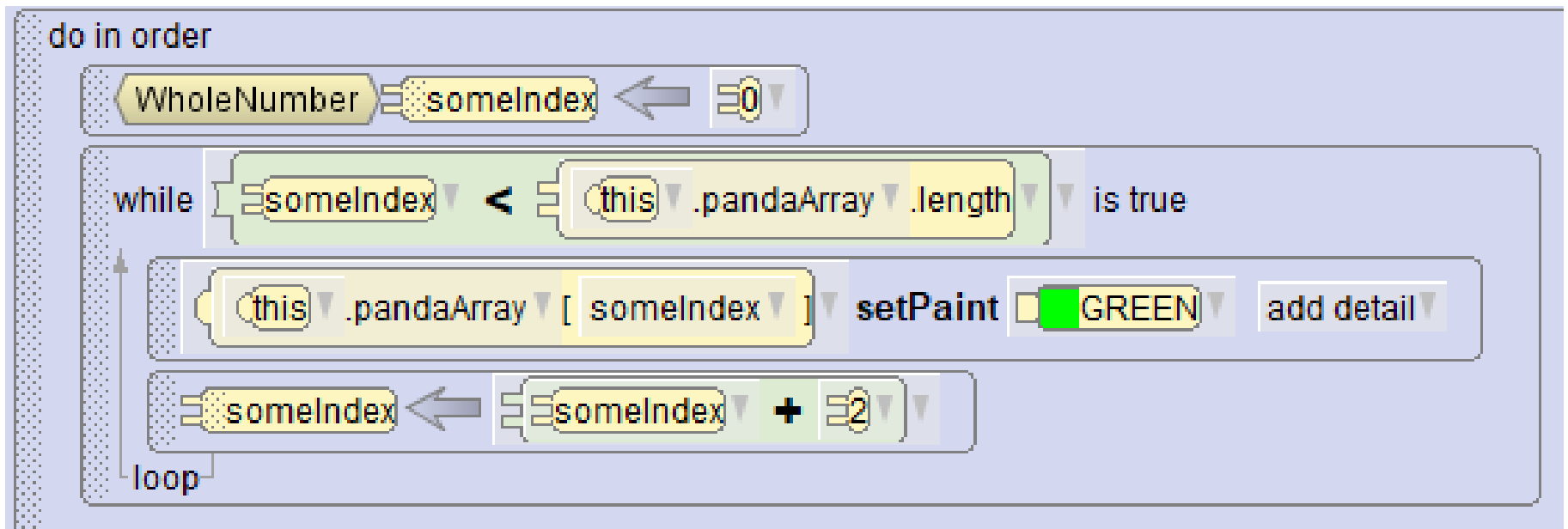
Q7 – How do you write code to color every other panda green in array?

- What is the missing line of code?



Q7 – How do you write code to color every other panda green in array?

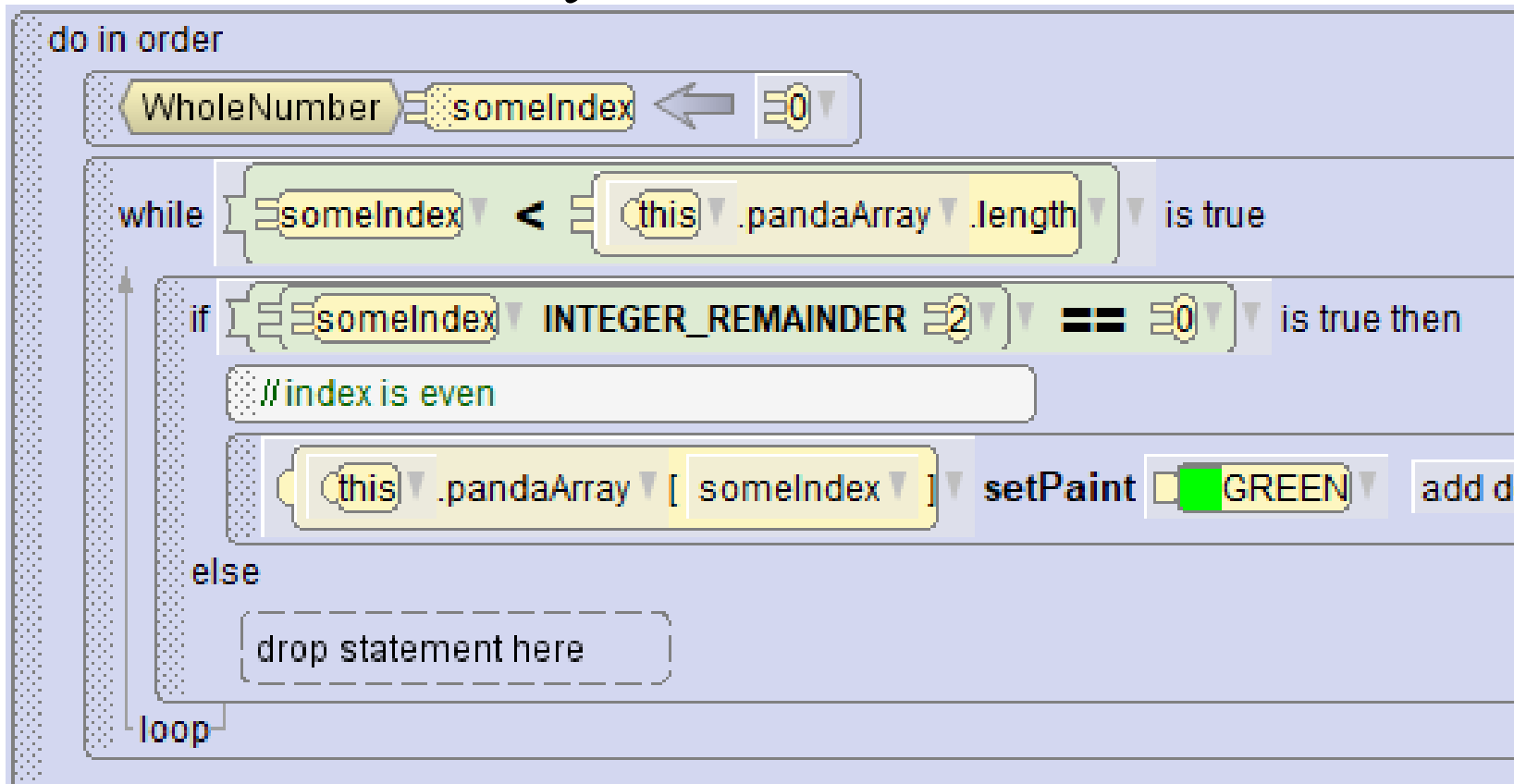
- One way, use array index, increment by 2
- Must use while loop, doesn't work w/count loop



Another possible way?

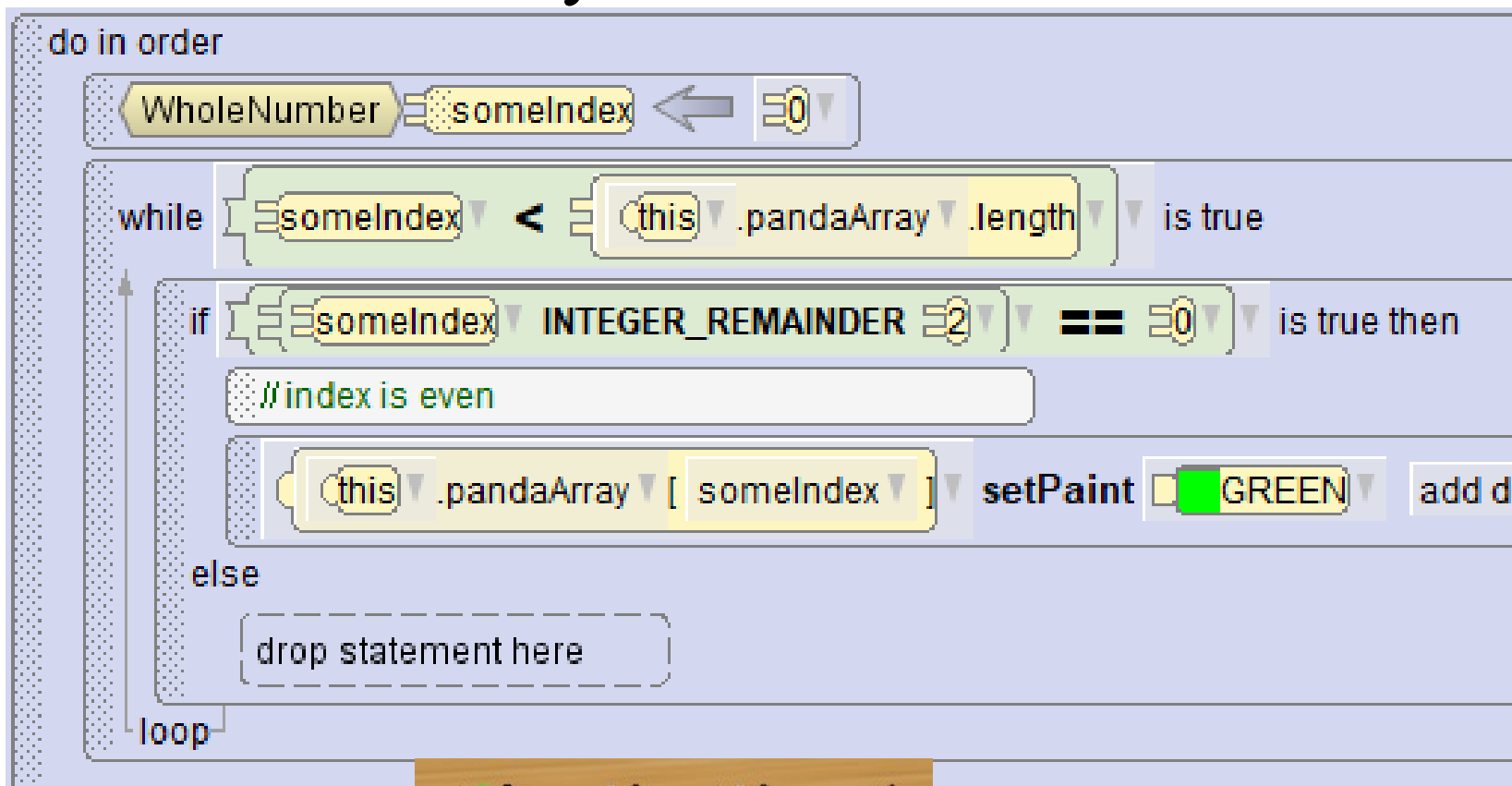
How do you write code to color every other panda green in array?

- Another way? Does this work?



How do you write code to color every other panda green in array?

- Another way? Does this work?

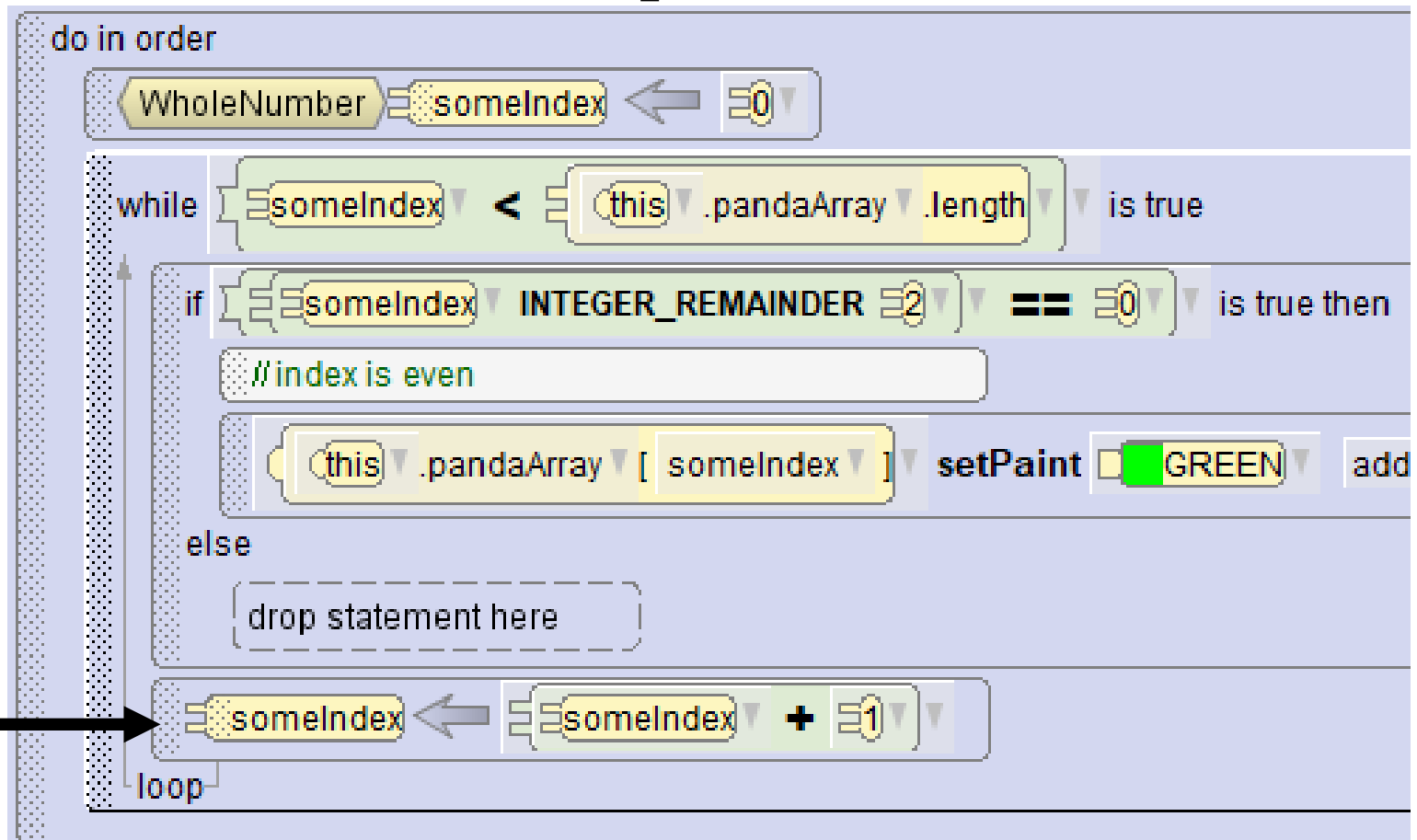


NO! Does this:



How do you write code to color every other panda green in array?

- **Correct Code** – update someIndex



Class Today

- Array of penguins

That is every other penguin in the array

