Python Class 6

Loops and Lists

Loops

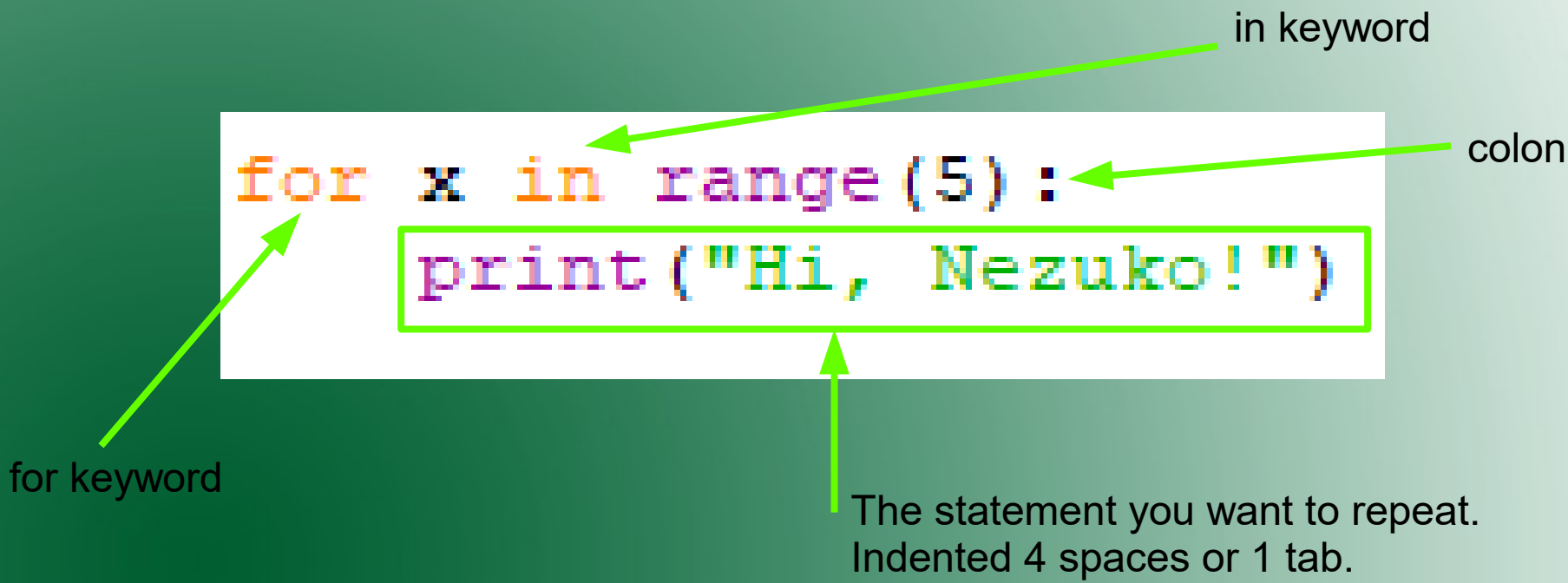
- A loop is a way to repeat a statement or command.

```
print("Hi, Nezuko!")
print("Hi, Nezuko!")
print("Hi, Nezuko!")
print("Hi, Nezuko!")
print("Hi, Nezuko!")
```

```
for x in range(5):
    print("Hi, Nezuko!")
```

Loops, Continued

- In Python, the most basic kind of loop is a for loop.
- A for loop has this syntax:



Ways to control a for-loop

- Use range(a)
- Use range(a,b)
- Use in + a list
- Use len(a)

Loop Exercises

- Create a loop that counts from 0 to 100
- Create a loop that multiplies numbers.

Gauss

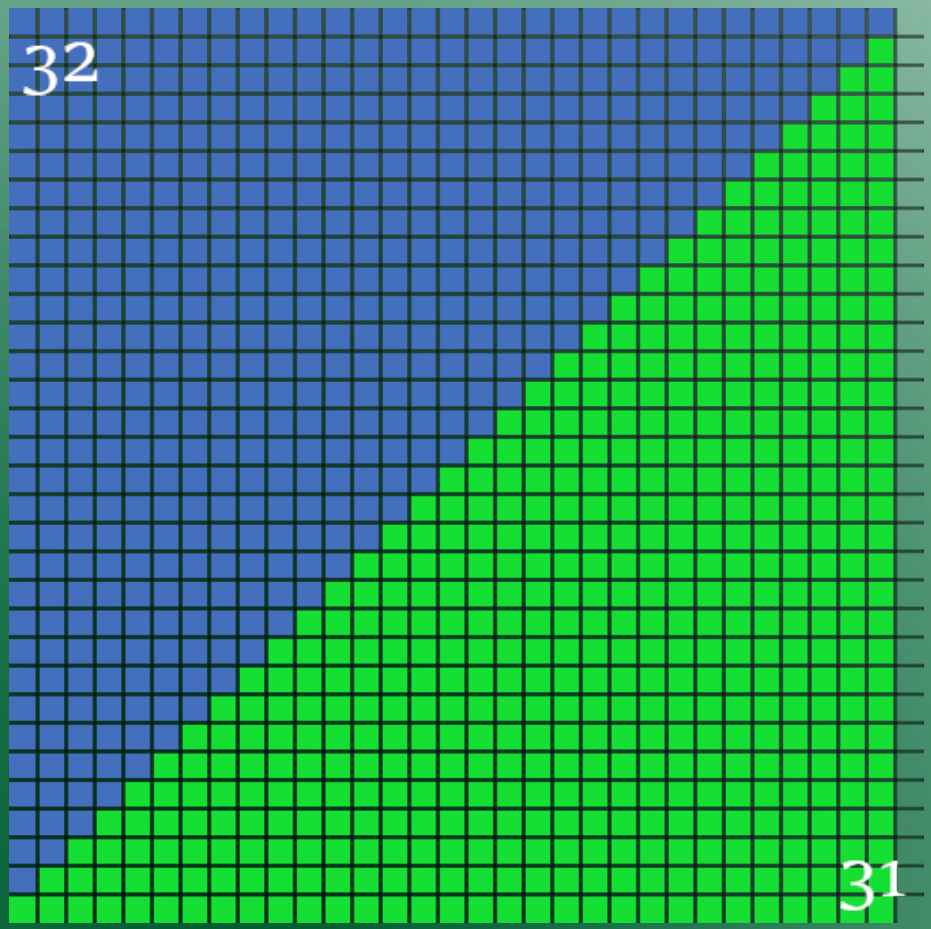
- According to a story, he did something bad in class.
- His teacher made him add all the numbers from 1 to 100.
- Gauss did this in a few seconds!

Way 1

31	30	29	28	27	26	25	24	23	22	21	20	19	18	.....	1
1	2	3	4	5	6	7	8	9	10	11	12	13	14	.....	31
32	32	32	32	32	32	32	32	32	32	32	32	32	32	.....	32

- Line up the numbers forwards and backwards.
- Add the columns. This sum is always the same.
- Multiply the sum by the number of rows, divide by 2.

Way 2



- Imagine the numbers from 1 to 31 as squares.
- Copy this and reverse it.
- Now, you have a rectangle with 2x the number of squares.
- To find the area of a rectangle, multiply the height by the width.
- Divide this by two.

Scope (有効範囲), Again

- Any variables you create inside a loop can only be used inside a loop.
- If you want to use a variable outside a loop, you need to create the variable outside the loop.

Loop exercises, continued

- Create a function with a loop that adds the first ten numbers.
- Create a function with a loop that adds the first num numbers.

Loop Guided Practice

- Write code that adds all the items in a list.
- my_list = [56,37,82,2340,5]

Loop Guided Practice

- Write code that adds all the items in a list.
- my_list = [56,37,82,2340,5]

Loop Exercise 2

- Write a program that multiplies all the numbers in a list.
- my_list = [56,37,82,2340,5]

Use loops to show the products and prices in our vending machine

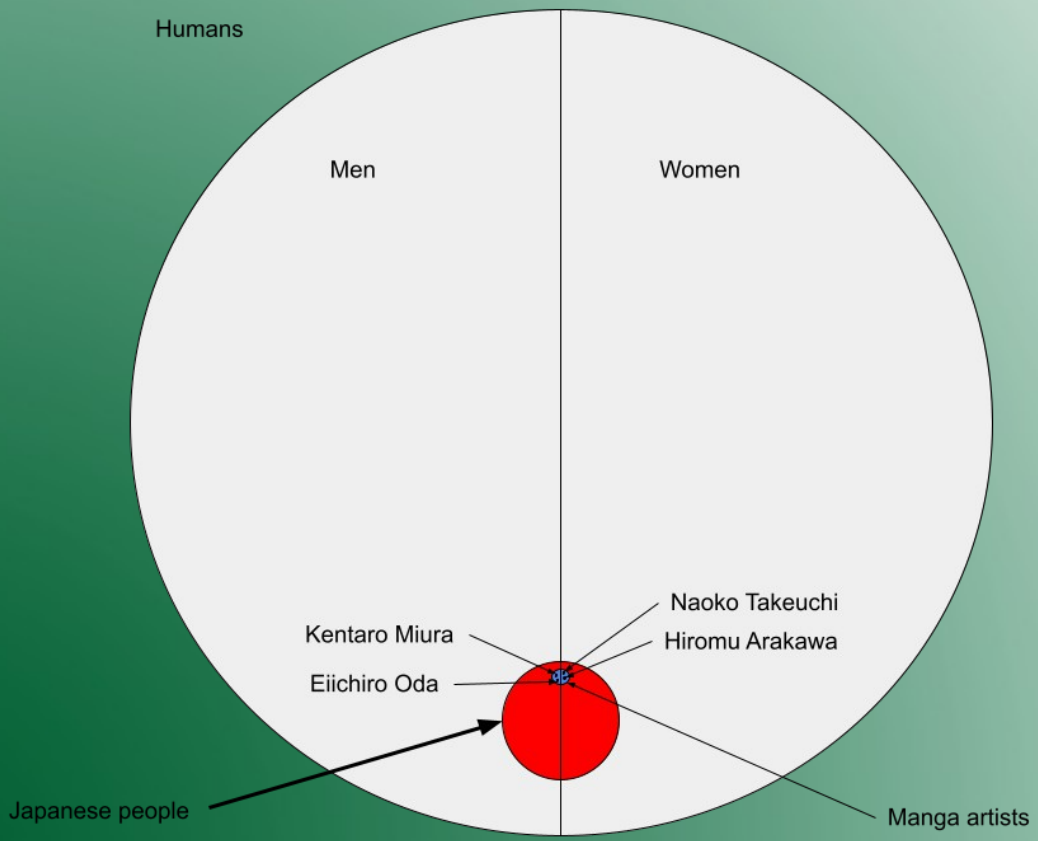
Classes (型；種類)

- There are many different classes or types in Python.
- We have used lists, strings, ints, floats, bools, and dates.
- One of the most powerful abilities in programming is to create your own classes.

Instance versus Class

- There is an important difference between an instance and a class.
- The instance is the actual object (実体; 実例)
- The class is the group (種類).
- Humans, Japanese people, and Manga artists are all groups or classes.
- Kentarou Miura, Eiichiro Oda, Naoko Takeuchi, and Hiromu Arakawa are instances of each class.

Instance versus class



Class Syntax; How to make a class

All classes have the __init__ function. This is used to create an instance of the class. We also use this to create class variables.

```
class My_Class:
    def __init__(self):
        self.name = ""
        self.number_of_students = 0
```

The class keyword (予約語)

The “self” keyword. Self (自己) means the instance of the class.
We need to use the self keyword to create variables for the class.

Create a class instance (实体; 实例*)*

- We use the name of the class to create an instance.

```
mc = My_Class()
mc.name = "POP"
mc.number_of_students = 4
```

Remember – the dot allows us to access variables inside the instance of a class

Review

- We have seen this a few times before.

```
my_birthday = datetime.date(1685,3,31)
```

The “self” keyword is always hidden when we create a class instance.

The __init__ function is also hidden.

In the example above, when we call datetime.date(year, month, day). This actually calls the __init__ function.

Adding functions

```
class My_Class:
    def __init__(self):
        self.name = ""
        self.number_of_students = 0
        self.dates = []

    def AddClassDate(self,date):
        self.dates.append(date)

    def RemoveClassDate(self,date):
        self.dates.remove(date)
```

Adding a product class to our Python project

- What variables will be important for a product?