

Homework ?? \rightsquigarrow Done?

Anyone?

```
if homework == "Done":  
    print("Yay!")  
else:  
    print("Nay..")
```

} # 1

\rightsquigarrow

So? In the chat please...

Lists
Loops → Strings → functions

s = "hello this is a sentence"

s2 = ""

for ch in s:

if ch == " ":

continue

s2 = s2 + ch

print(s2)

✓
output!

hellothisisasentence

s = "hello"

i = 0

j = len(s)

while (i < j):

if (i % 2 == 1):

print(s[i])

i = i + 1

i is odd

✓

h h e

e l l

l o

l

o

→ 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17
 S = "this is a sentence"

W = []

CS = ""

i = 0

j = len(s)

0 1 2 3 4 5 6 7 8 9 10 11
 [t|h|i|s| |i|s| |a| |s|e|]

↑ ↑
 i = 4
 ≥ 0

while (i < j):

18
times

if (s[i] == " ") and (i > 0) and (s[i-1] != " ")

True → W.append(cs)
CS = "" → CS

else:
 CS = CS + s[i]
 i = i + 1

print(W)

W = []
 W = ["this"]
 W = ["this",
 "is"]
 ["this", "is", "a",
 "sentence"]

i	condition	CS
i = 0	False	"t"
i = 1	False	"th"
i = 2	False	"thi"
i = 3	False	"this"
i = 4	True	""
i = 5	False	"i"
i = 6	False	"is"
i = 7	True	

FUNCTIONS

Assembly Lang

• Commands

- `mov [address], ax`

```
mov [i], 0
```

$$i = 0$$

jmp \rightarrow if/else

1: $i = 0$

2: $j = i + 1$

```
3: if i > j then
        jmp 10
```

4:
5:
6:
7:
8:

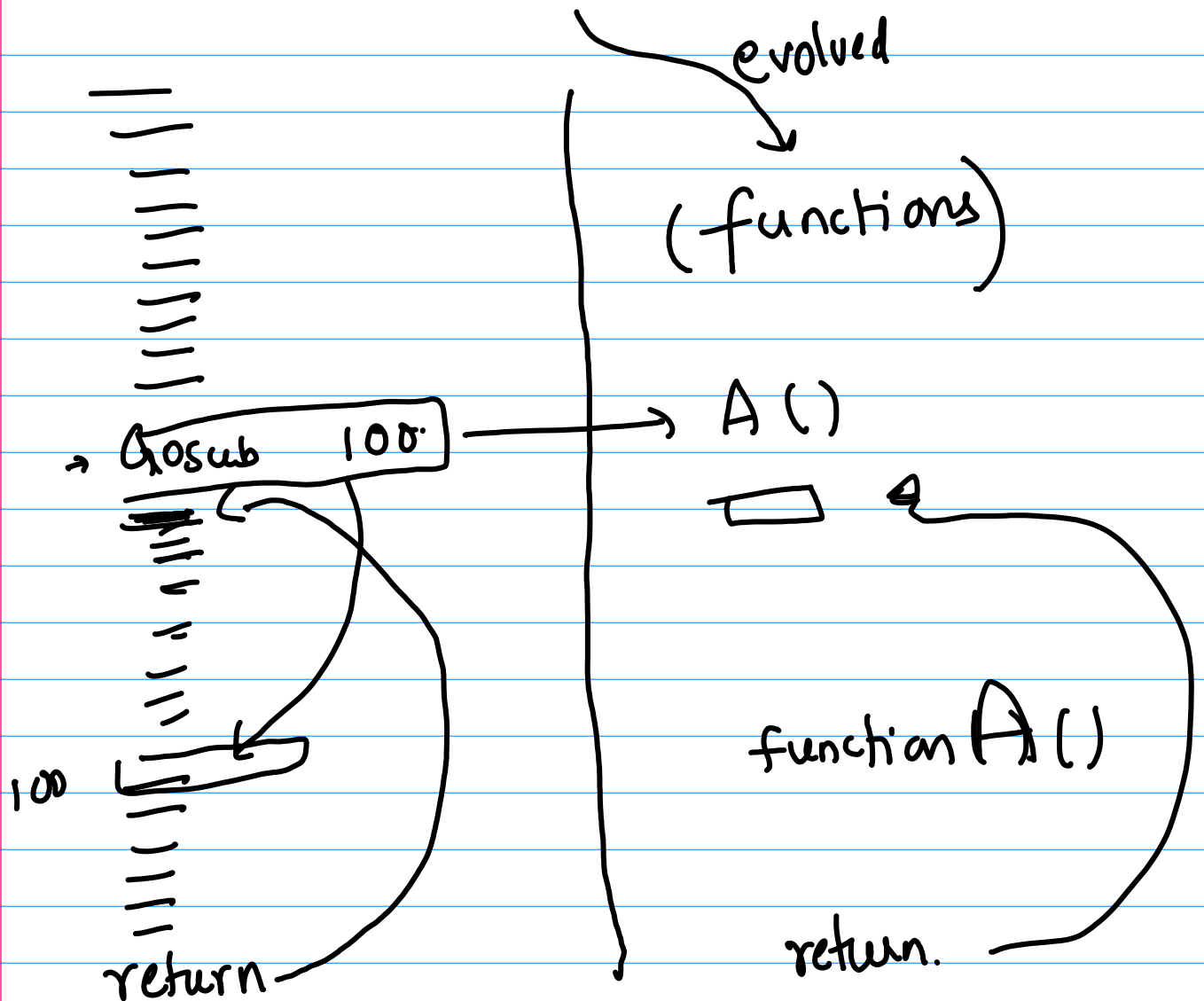
```

9: jmp ll
10: print "hello"
11:
12:

```

High-level Languages → BASIC

↳ Sub-routines



Programmers \rightarrow Mathematicians

Maths \rightarrow functions

$+, -, / \times$
operators

(Set)

What ~~are~~ is the set of students in this class?

SET
OF
STUDENTS

{ "Iksha", "Adit", "Yuv", "Rupanjana", "Kriti" }

A set of 5 colors

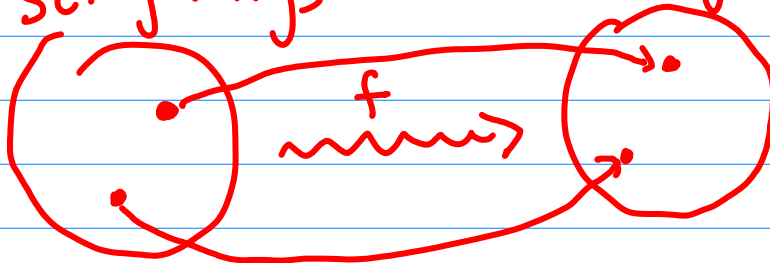
{ "red", "light blue", "black", "orange", "purple" }

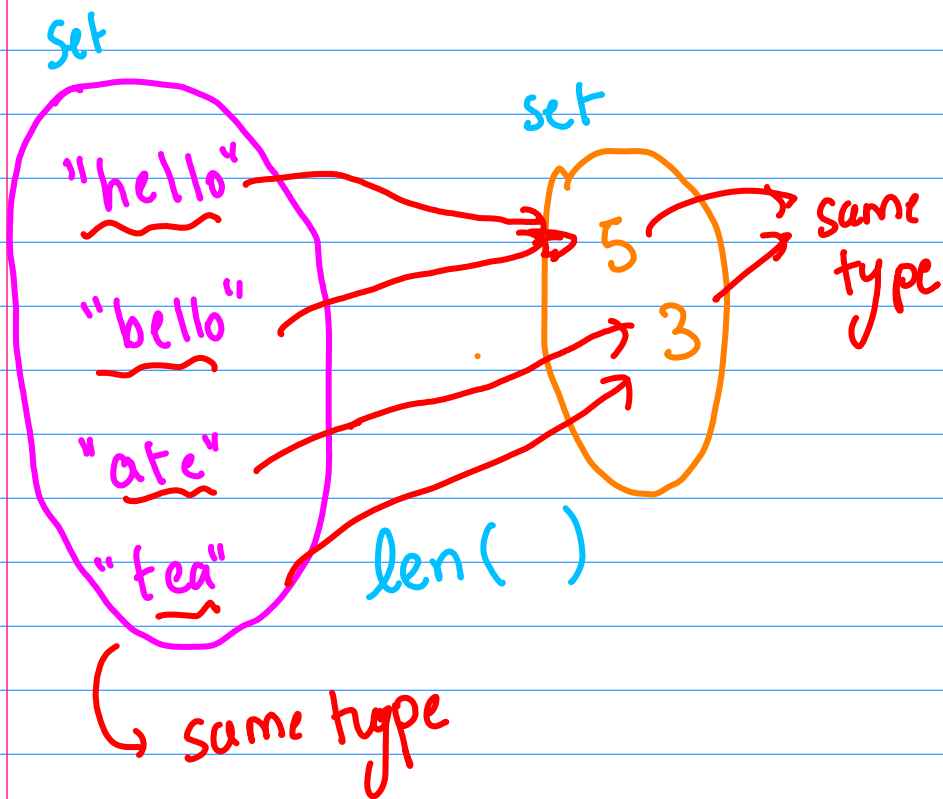
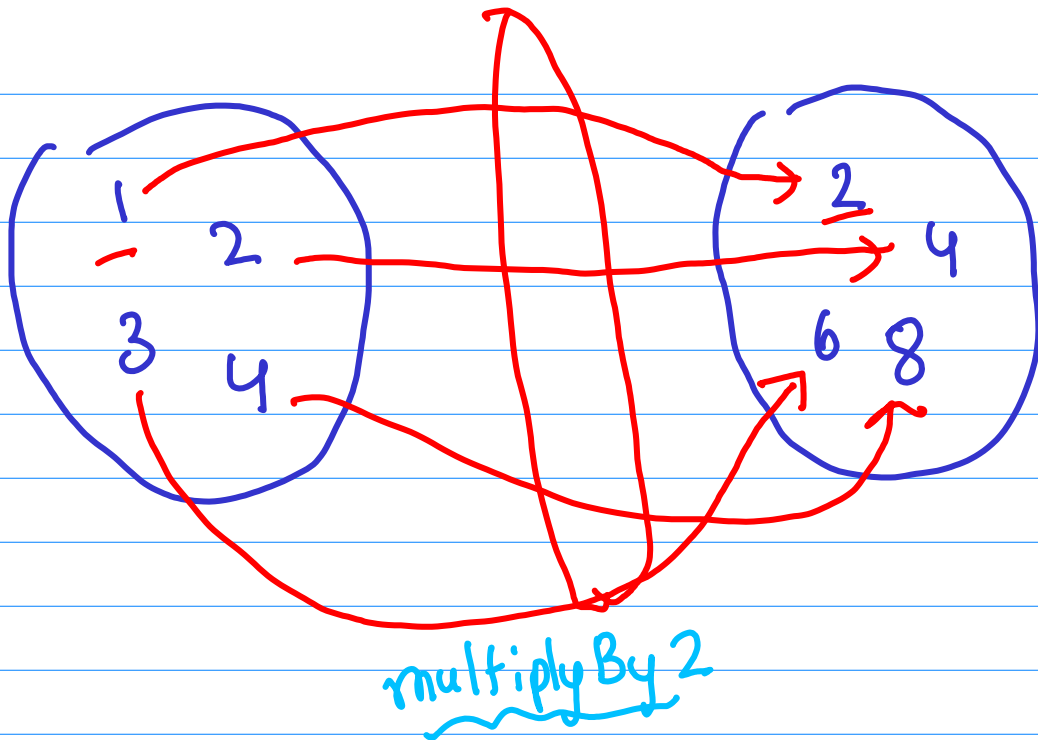
function

favoriteColor()

Set of things

Set of things





→ Set is a non-repeating collection of items of the same type.

• Set of all integers \rightarrow int

• Set of all strings \rightarrow ~~set~~ str

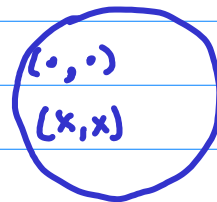
•

— x ————— x ————— x —————

CARTESIAN PRODUCT
on
Sets



$$C = A \times B$$



Example of Cartesian products \rightarrow

$$\underline{A} = \{ \underline{\text{"Yuv"}}, \underline{\text{"Adit"}}, \underline{\text{"Ruparjan"}} \} \quad 3$$

$$\underline{B} = \{ \underline{\text{"red"}}, \underline{\text{"green"}} \} \quad 2$$

$$\underline{A \times B} = \{ \underbrace{(\text{"Yuv"}, \text{"red"})}_A, \underbrace{(\text{"Yuv"}, \text{"green"})}_B, \\ (\text{"Adit"}, \text{"red"}), (\text{"Adit"}, \text{"green"}), \\ (\text{"Ruparjan"}, \text{"red"}), (\text{"Ruparjan"}, \text{"green"}) \}$$

$$A = \{ \underline{1}, \underline{2}, \underline{3} \}$$

$$B = \{ \text{"a"}, \text{"x"}, \text{"y"} \}$$

$$A \times B = \{ \boxed{(1, \text{"a"})}, (1, \text{"x"}), \boxed{(1, \text{"y"})}, \\ (2, \text{"a"}), \boxed{(2, \text{"x"})}, (2, \text{"y"}), \\ (3, \text{"a"}), (3, \text{"x"}), (3, \text{"y"}) \}$$

9

$A \times B$

$A \times B \times C$

→ Cartesian product

$$A = \{ \overset{\circ}{1}, 2 \} \quad B = \{ \overset{\circ}{\text{"c"}}, \text{"d"} \} \quad C = \{ \overset{\times}{1.2}, \overset{\checkmark}{3.3} \}$$

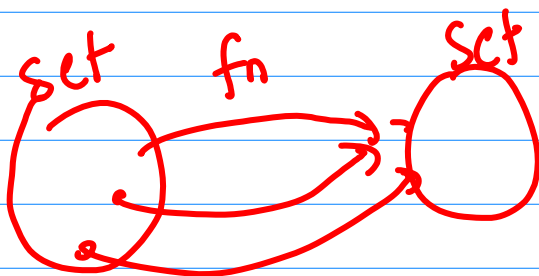
$\times \quad \times \quad \times$

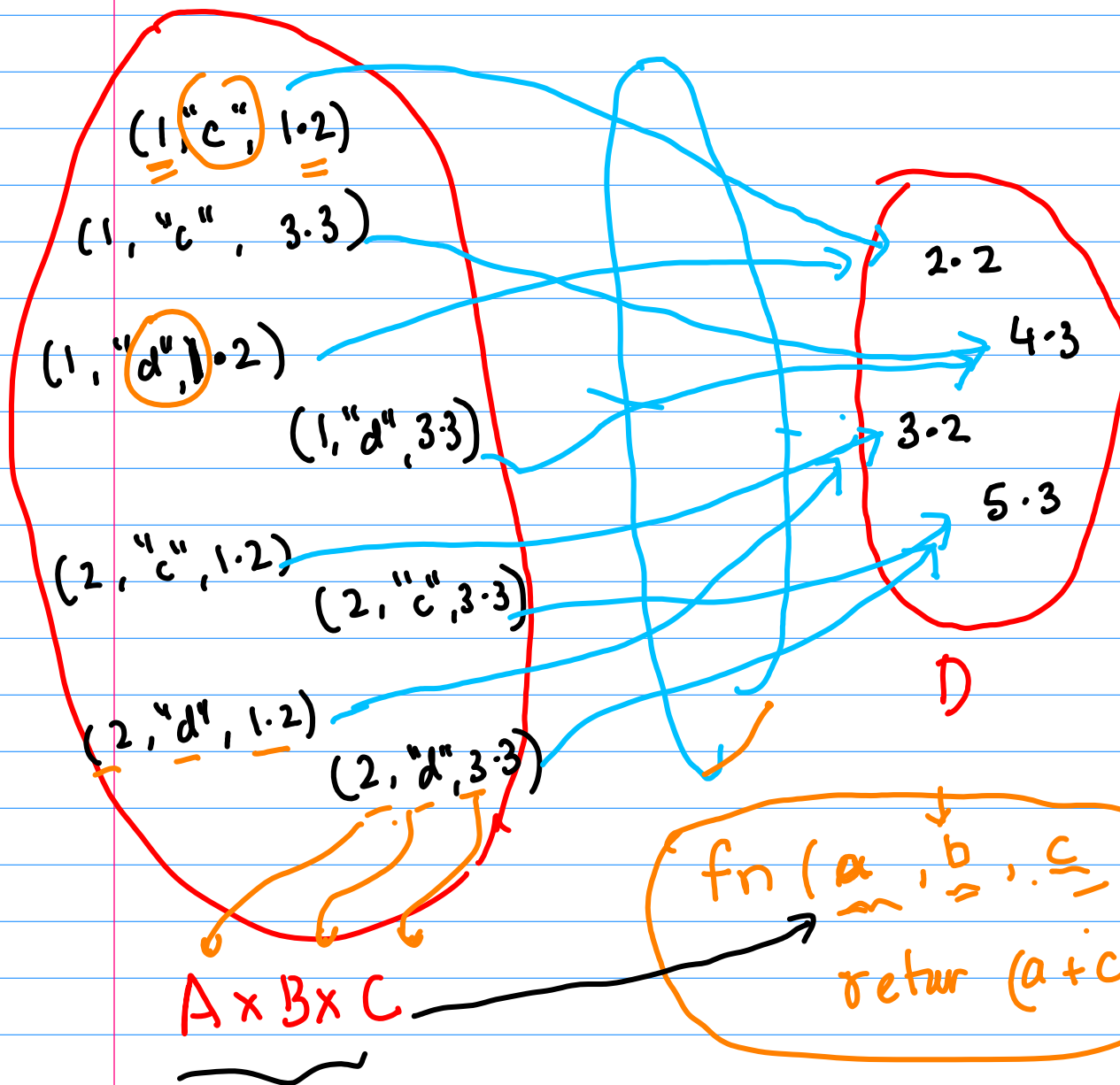
$$A \times B \times C = \left\{ \begin{array}{l} (1, \text{"c"}, 1.2), (1, \text{"c"}, 3.3), \\ (1, \text{"d"}, 1.2), (1, \text{"d"}, 3.3), \\ (2, \text{"c"}, 1.2), (2, \text{"c"}, 3.3), \\ (2, \text{"d"}, 1.2), (2, \text{"d"}, 3.3) \end{array} \right\}$$

8 elements

no repeating items

is also a set





Do you see how Cartesian products are related to "parameters" in a function (programming wala)

History of functions in programming

Python functions

define

call

def nameOfFunction(name, age, ...):

parameters are variables

return age * 2

(Nothing is also something)

comes from maths

nameOfFunction ("hello", 27)

{ } empty set
→ something real

value → None
→ 54