

Python

Python is a high level, interpreted & general purpose, dynamic programming language which focus on used in many fields.

Human
Readable

```
print ("Hello");
```

C/C++
cout << "___"
Machine

CODE || READABILITY

Who's Using Python?

- * Software Engineers
- * Web Developers.
- * Data Scientists
- * Network Engineers
- * Data Analysts
- * Mathematicians
- * Accountants

Kids

Why Python?

① Easy of Coding → learning curve of Python is very low.

```
str="Hello World"
```

Solve complex problems using less time & with fewer lines of code

Java

```
str.substring(0,3)
```

```
str.substring(0,3)
```

JS

```
str[0:3]
```

Python

```
str[0:3]
```

② GENERAL PURPOSE

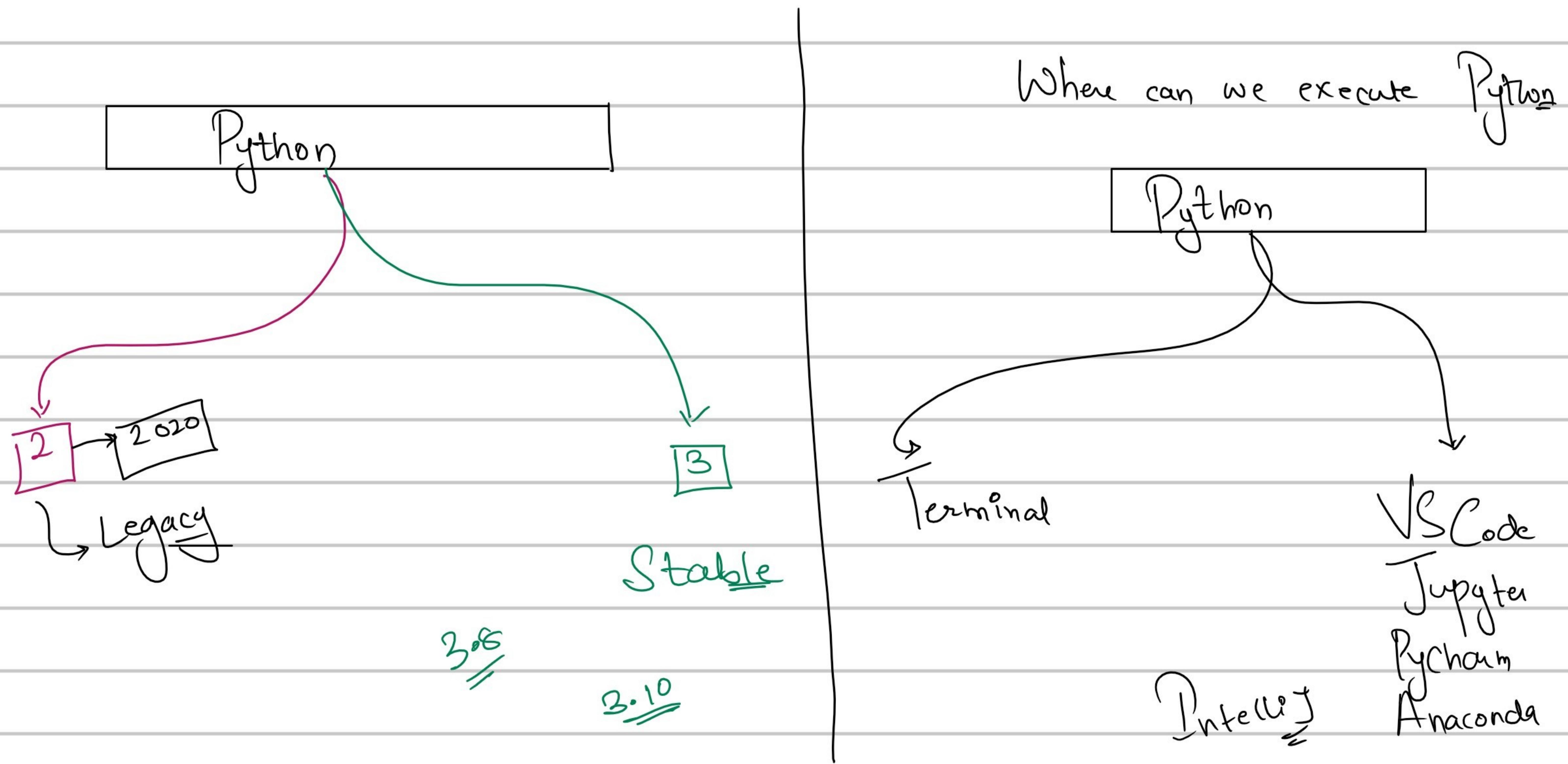
- ① Data Science
- ⑥ Testing
- ⑪ Desktop App
- ② Data Analytics
- ⑤ AI
- ⑫ Video Games
- ③ Machine Learning
- ⑧ Big Data
- ⑬ Data Visualization
- ④ Trading Programs
- ⑨ Mobile App
- ⑭ Statistics
- ⑦ Automation.
- ⑩ API Development

② High Level

- ⑦ Cross Platform → no dependency on OS

⑤ Large Ecosystem → there are tons of libraries available for python.

⑥ Huge Community Support



Data Types in Python

Type	Data Types
Text	str
Numeric	int, float, complex
Sequence	list, range, tuple
Map	dict
Set	set, frozenset
Boolean	bool
Binary	byte, bytearray, memoryview

Keywords in Python

Keyword	Description
and //	A logical operator
as //	To create an alias
assert //	For debugging
break ,	To break out of a loop
class //	To define a class
continue ,	To continue to the next iteration of a loop
def //	To define a function
del //	To delete an object
elif ↗ else ↗ if	Used in conditional statements, same as else if
else	Used in conditional statements
except ↗ catch //	Used with exceptions, what to do when an exception occurs

Keywords in Python

Keywords	Description
false	Boolean value, result of comparison operations
False	
finally //	Used with exceptions, a block of code that will be executed no matter if there is an exception or not
for	To create a for loop
from	To import specific parts of a module
global ↗	To declare a global variable
if ↗	To make a conditional statement
import ↗	To import a module
in ↗	To check if a value is present in a list, tuple, etc.
is ↗	To test if two variables are equal
lambda ↗	To create an anonymous function

Keywords in Python

Keyword	Description
None //	Represents a null value
nonlocal ,	To declare a non-local variable
not //	A logical operator
or //	A logical operator
pass //	A null statement, a statement that will do nothing
raise ,	To raise an exception
return //	To exit a function and return a value
True ↗	Boolean value, result of comparison operations
try //	To make a try...except statement
while //	To create a while loop
with //	Used to simplify exception handling
yield //	To end a function, returns a generator

Conventions in Python

* function | variable

get_location_for_car()
tax_amount

Snake Casing →

One_two_three-four

* class

Pascal Casing

→ OneTwoThreefour

BankDetail

MyPoint

1

1 2 ③ 4 5 6

range

[from , to]
↓ ↓

k i t k a t

zero one
based based

0 →

0 ① 2 3 4 5

-ve

-6 -5 -4 -3 -2 -1

word[1 : 3]

1 1 2 3 4 ⑤ 6 7 8 9 10 ⑪ 12 ⑬ 14 15 16 17 18 19 20
I n t e r n a t i o n a l i z a t i o n
0 ① 1 2 3 4 ⑥ 6 7 ⑧ 9 10 11 12 13 14 15 16 17 18 19

international
inter
intan

0:13
0:5
0:6

nation 5:11
national 5:13
ion 8:11, 17:9:11

on 16:20
18:1
18:1
9:11

\rightarrow space

Flow Control

{
} X

Indentation

if condition:
 $\star \star \star \star \star$ statements

else

$\star \star \star \star \star$ statements

String Interpolation in Python

a=10
b=20

When we write a string
without breaking for

including variables

[" Value of a is "+a+", and value of b is "+b+"]

message=f" Value of a is {a}, value of b is {b}";

Functions

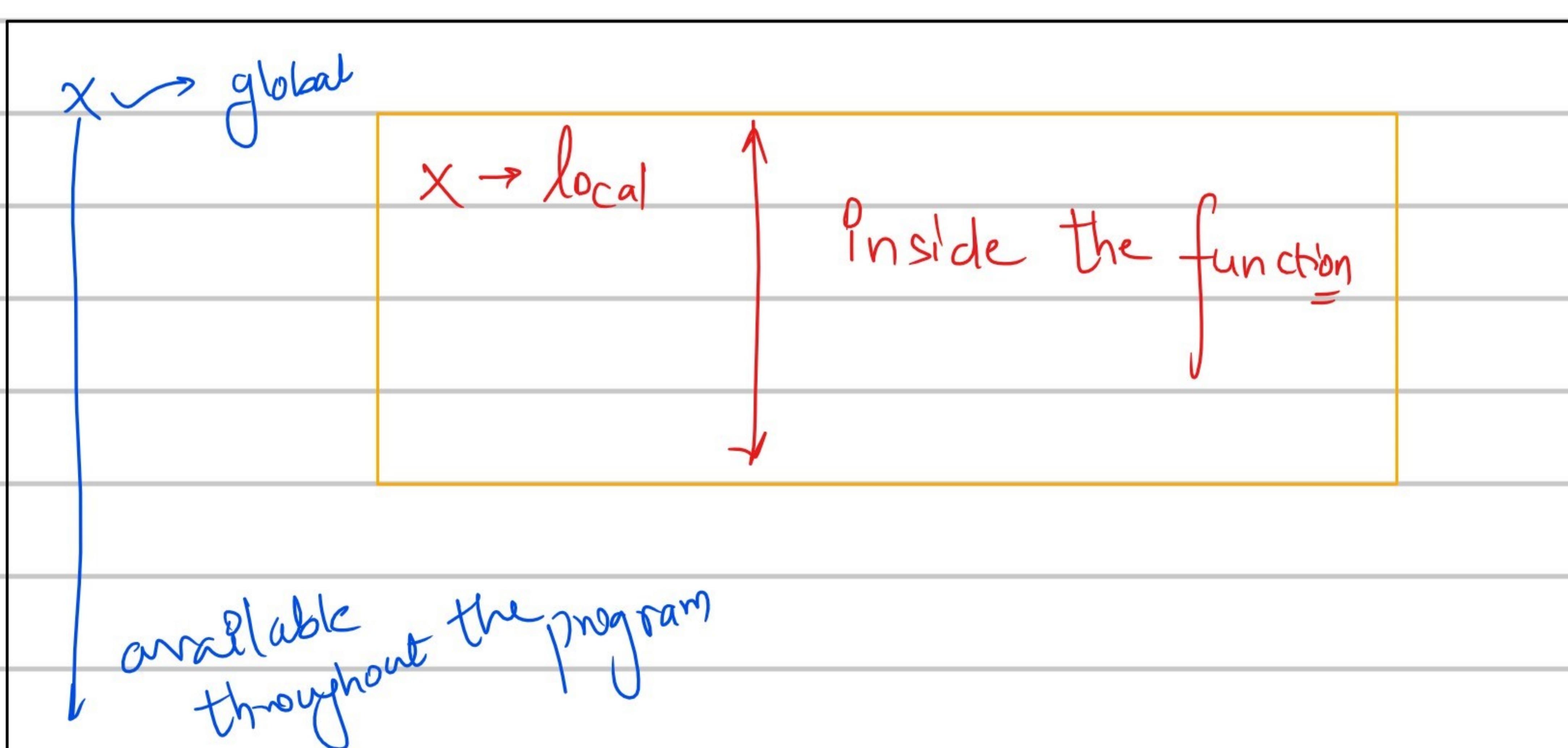
group of related statements
which performe a
specific task.

CODE ON DEMAND

```
def function_name(parameters):  
    """ doc_string """  
    statement(s)  
    return someValue,
```

→ Optional

Scopes in Python



* Python doesn't support block scope
* min scope it supports is function

Data Structures

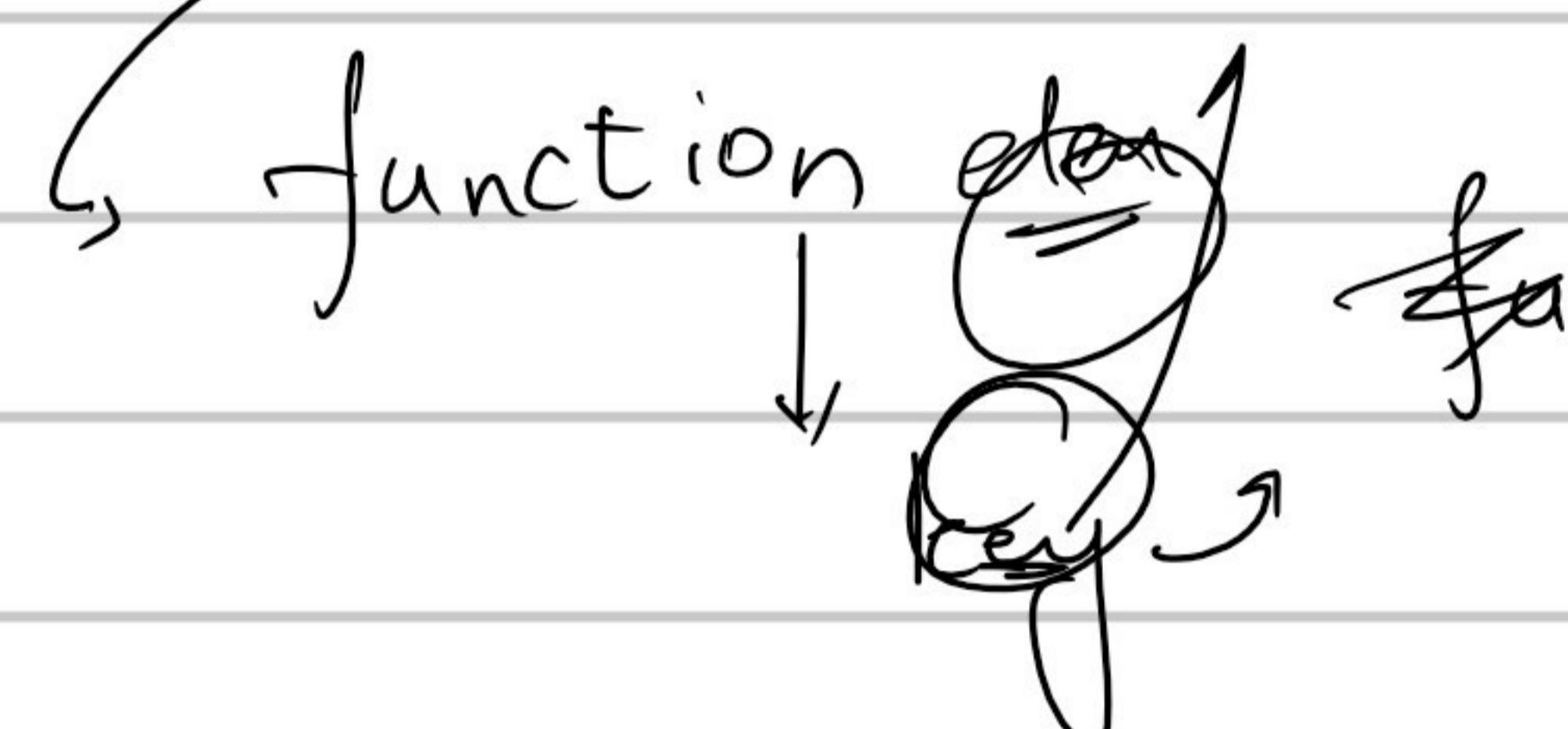
list tuple range set dict

Sorting

numbers = [1, 5, 8, 0, 9]

$$[0, 1, \mathbb{S}, \mathbb{E}, g]$$

```
Cart = [ (prod, price),  
         (prod, price),  
         (prod, price) ]
```



Lambda Functions

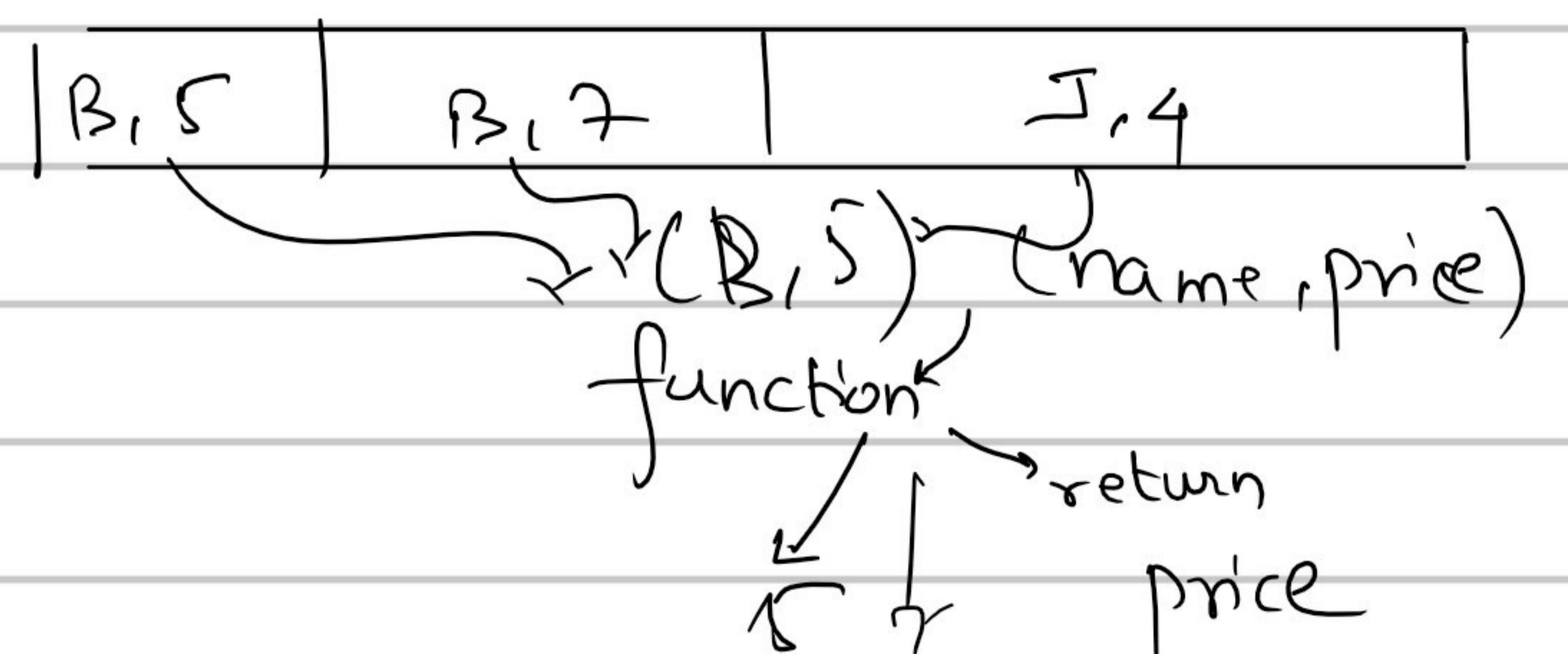
→ anonymous functions → functions without any name.

Structure of a lambda function

lambda Parameter : expression

no return statement
expression → executable
↓ execute
else
↳ value
↓
return

map.



S	7	4
---	---	---

Exception handling

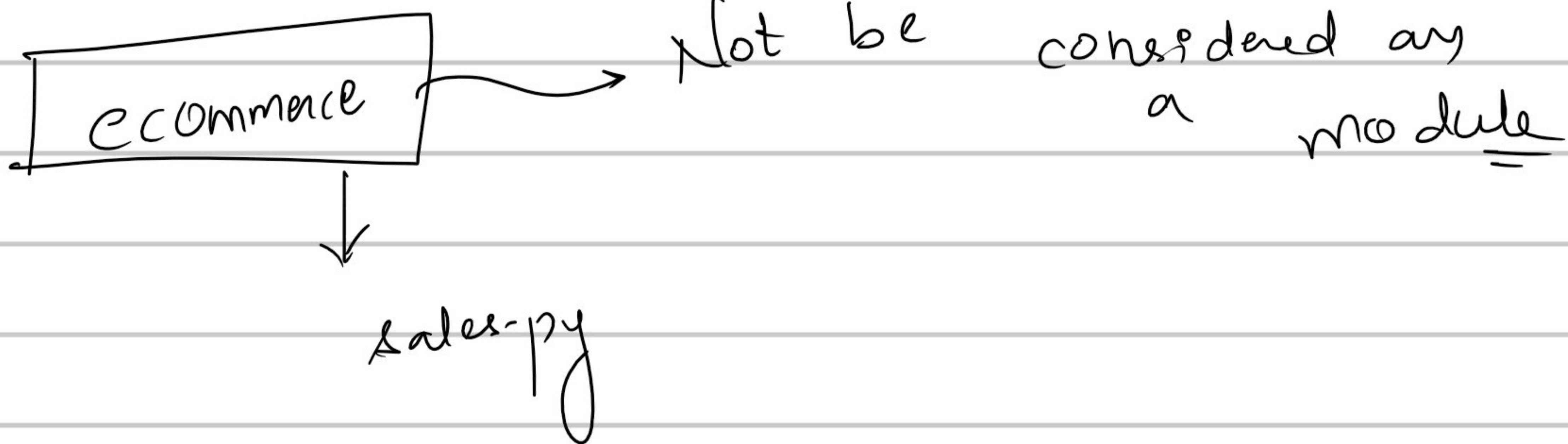
→ unexpected erroneous event which breaks the execution of the code.

try:

except Error:

Modules

allows for the segregation in the code.



* Regex *

Regular Expression

zartab@codewithz.com ✓

zartab@abc@xyz.com ✗

zartab0@gmail.com ✗

finding | matching

Pattern in a
string

Regex

Basic

Extended

Symbol	What it represents?
$*$ <small>= ~ o - n</small>	Zero or more occurrences of the character that preceeds this asterisk
$.$	A wild card that represents any character <small>(alpha + num + sc)</small>
$\backslash s$	Represents whitespace
<u>[pqr]</u>	A single character which can be either a 'p' , 'q' or an 'r'
<u>[a-d]</u>	A single character that falls in the range 'a-d'
<u>[^pq]</u>	A single character that is neither 'p' nor 'q'
<u>^pattern</u>	<u>^</u> is an anchor tag that represents the beginning of line
<u>pattern\$</u>	\$ is an anchor tag that represents the end of line



Understand the Requirement: What needs to be included or excluded

- fooaaaabar
- fooabar
- foobar
- fooaabbar
- fooxxxbar
- fooxbar

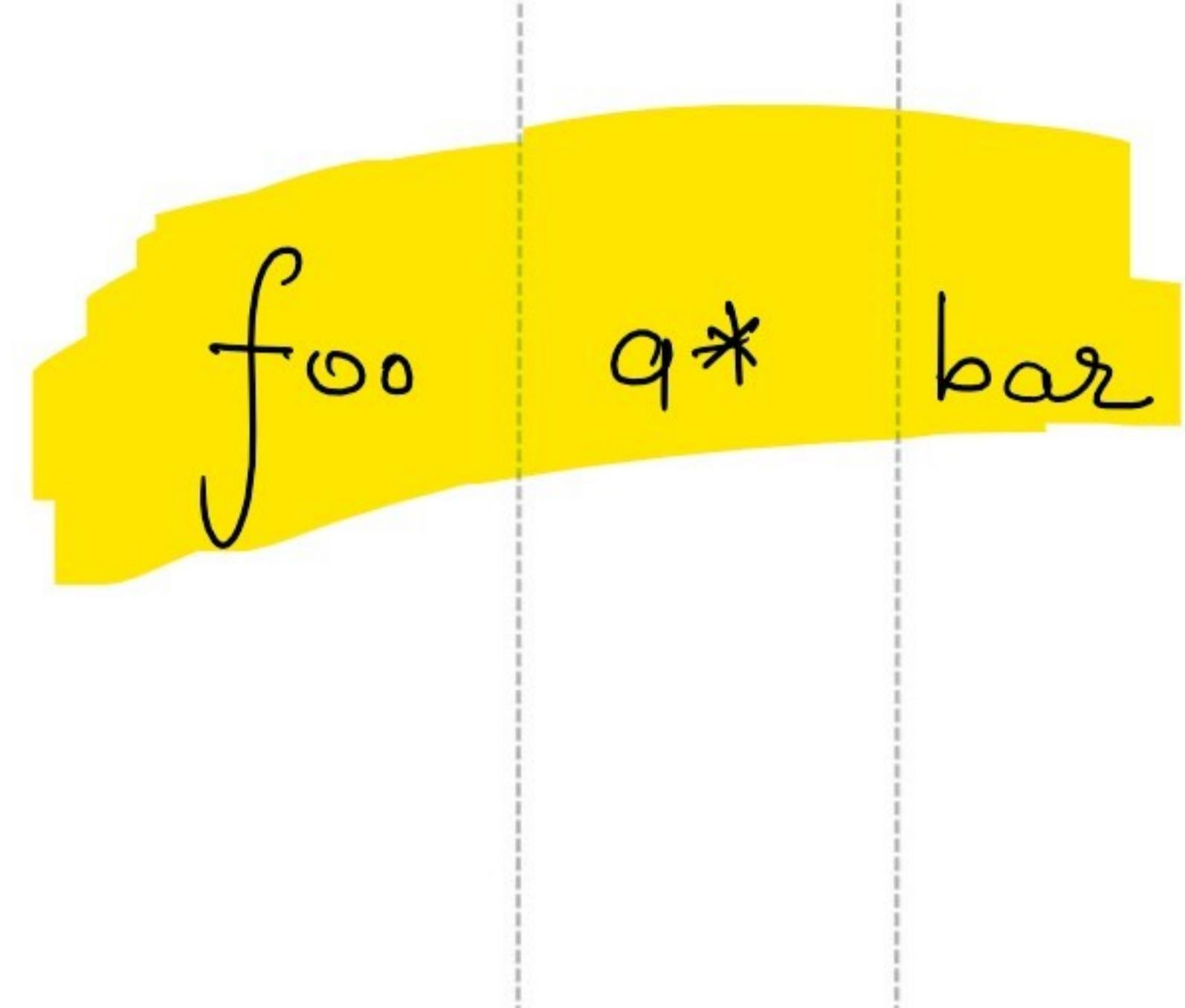


Identify the pattern in inclusion or exclusion list

- foo aaaa bar
- foo a bar
- foo aa bar



Final Regular Expression



a* - Zero or more occurrences o 'a' (The character just preceding the asterisk)



Understand the Requirement: What needs to be included or excluded

- foo3bar
- fooabar
- fooxbar
- baryfoo
- foobar
- foooxybar
- foocbar

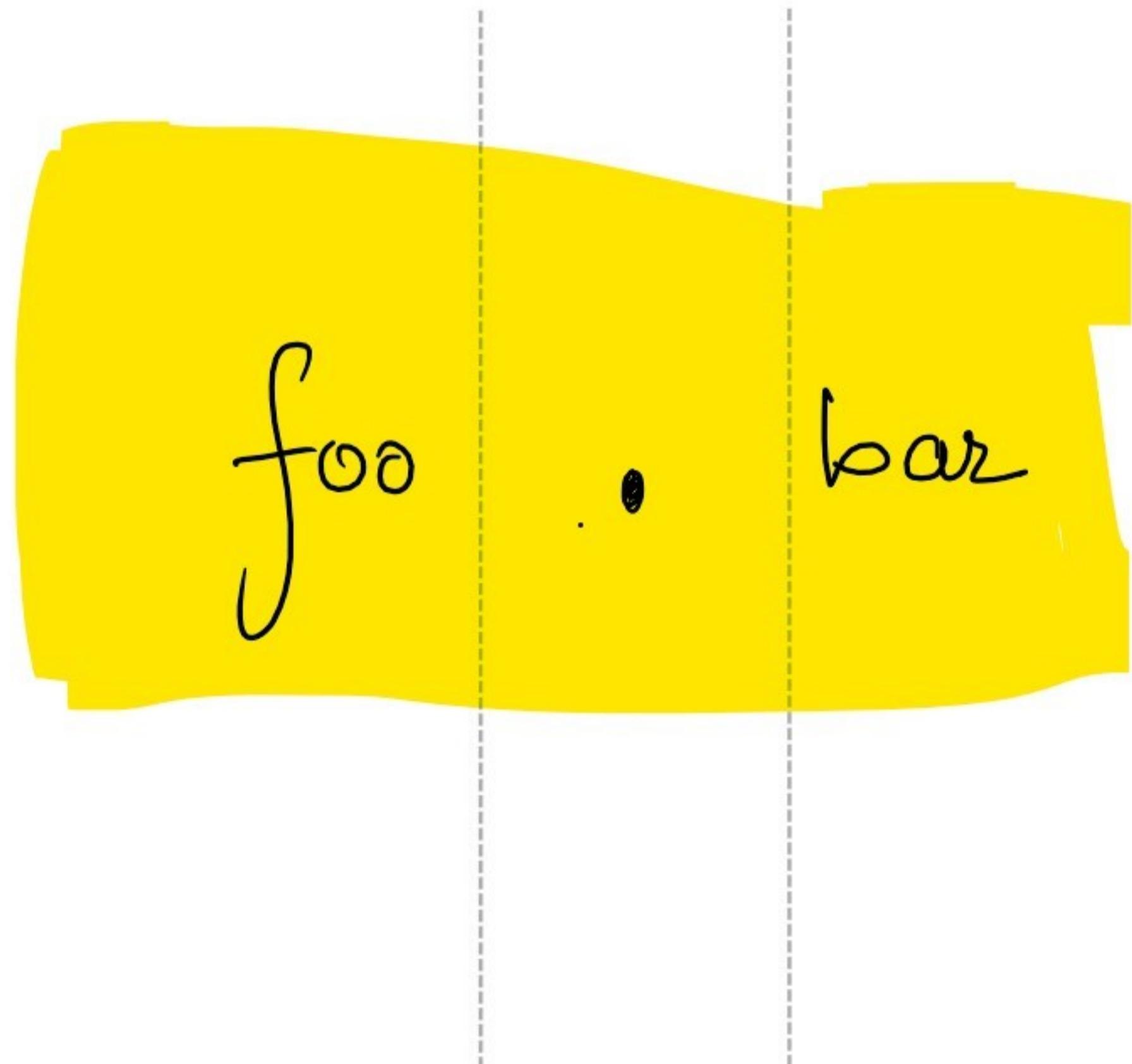


Identify the pattern in inclusion or exclusion list

- foo (a) bar
- foo (x) bar
- foo (c) bar
- foo (.) bar



Final Regular Expression



. - Single wildcard . Can represent only ONE character [any] in single position

1

Understand the Requirement: What needs to be included or excluded

- foobar
- barfoo
- fooabcbbar
- fooxcbar
- barcbyfoo
- foozbar
- barafoo
- barabfoo

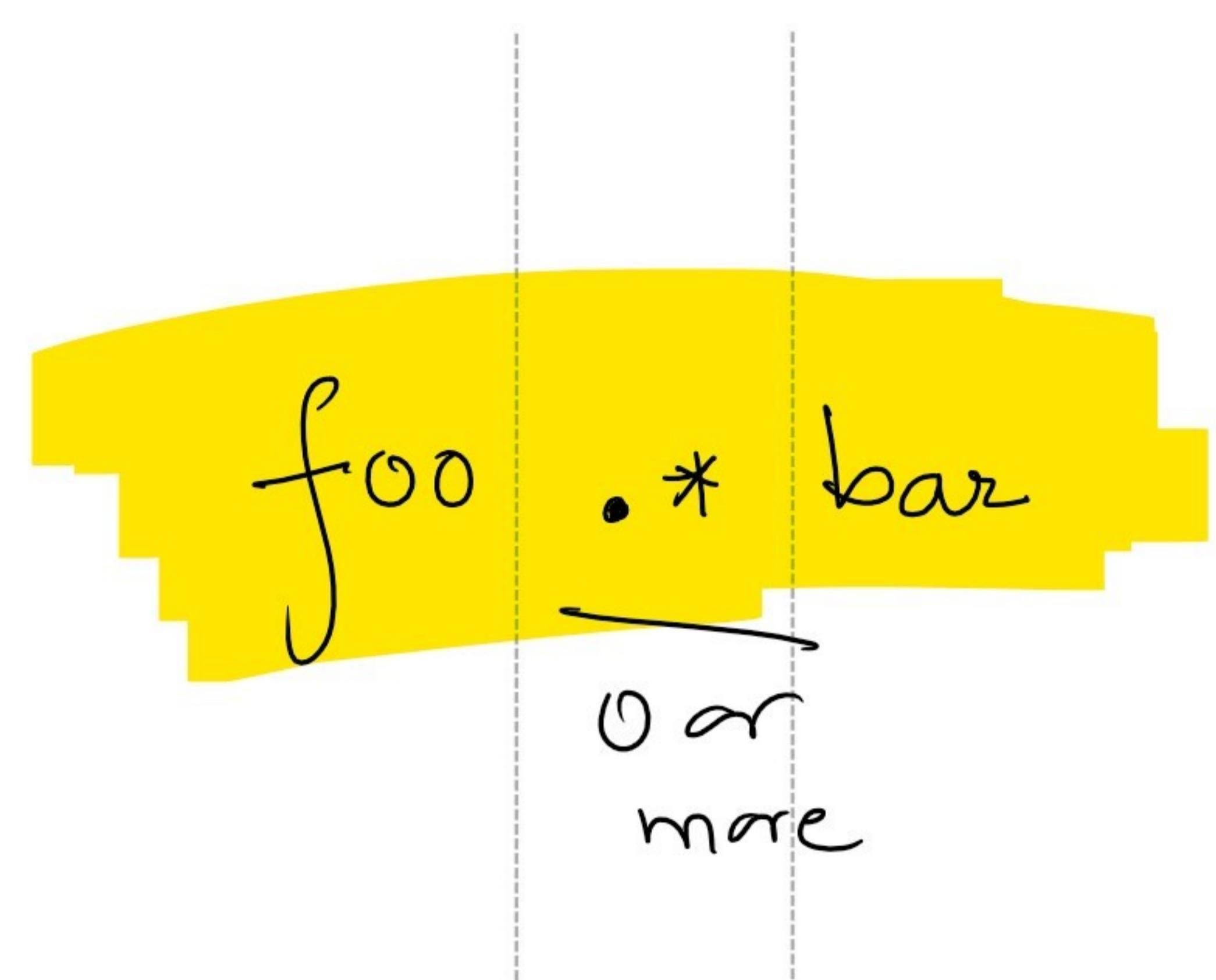
2

Identify the pattern in inclusion or exclusion list

<input checked="" type="checkbox"/> foo	_o	bar
<input checked="" type="checkbox"/> foo	abc	bar
<input checked="" type="checkbox"/> foo	xc	bar
<input checked="" type="checkbox"/> foo	z	bar

3

Final Regular Expression



.* - Zero or more occurrences of wildcard, which means zero or more occurrences of any character

1

Understand the Requirement: What needs to be included or excluded

2

Identify the pattern in inclusion or exclusion list

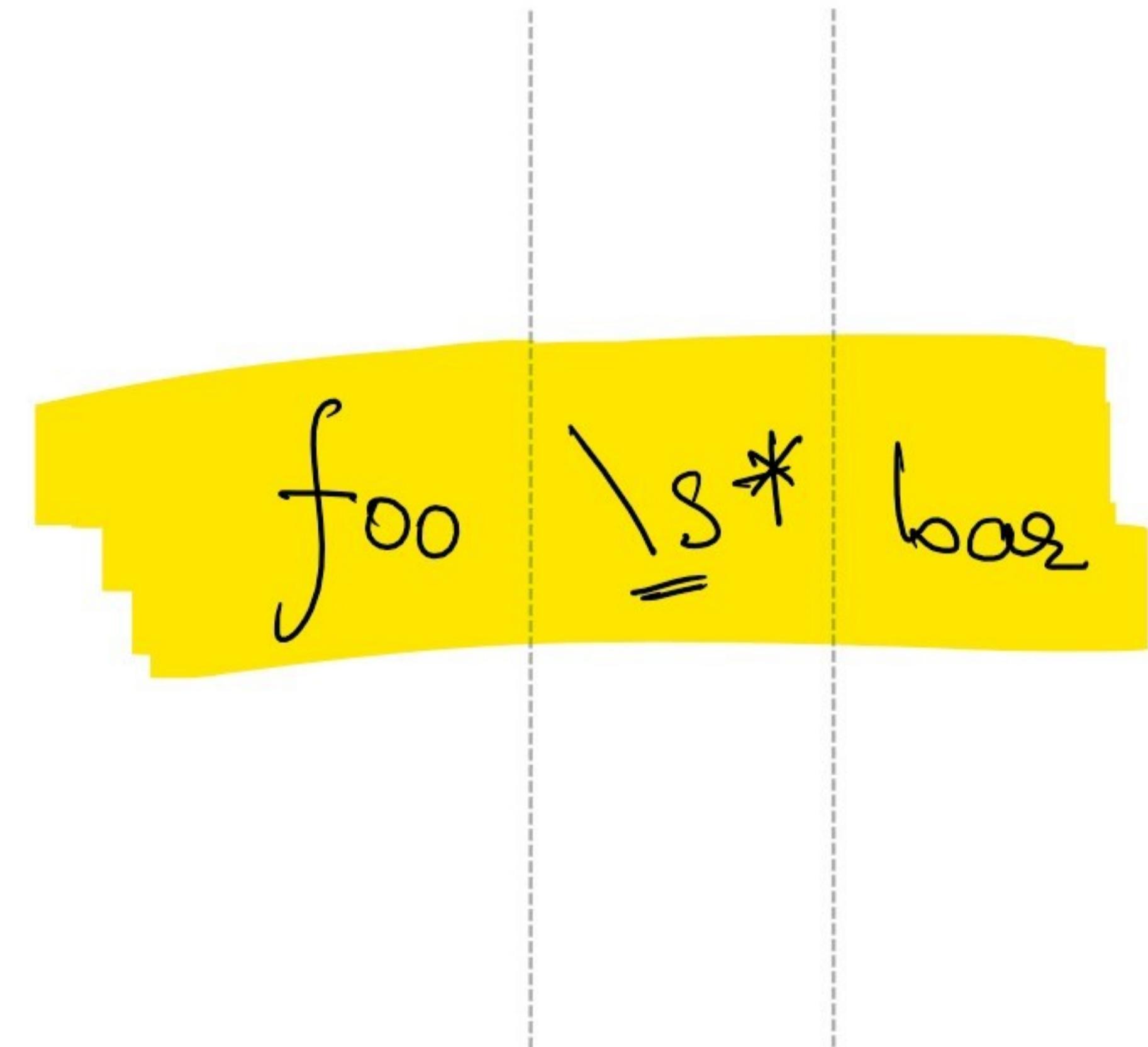
3

Final Regular Expression

\s → space

- fooxxxbar
- foo bar
- foobar
- fooxxbbar
- foo bar
- foo bar
- foobar
- fooyyybar

<input checked="" type="checkbox"/> foo	<3 spaces>	bar
<input checked="" type="checkbox"/> foo	<1 spaces>	bar
<input checked="" type="checkbox"/> foo	<6 spaces>	bar
<input checked="" type="checkbox"/> foo	<0 spaces>	bar



\s represents whitespace. \s* represents zero or more occurrence of whitespace

1

Understand the Requirement: What needs to be included or excluded

2

Identify the pattern in inclusion or exclusion list

3

Final Regular Expression

foo
 moo
 coo
 doo
 poo
 loo
 boo
 hoo

f oo
 c oo
 l oo

either one of the options

[fcl] oo

[abc] - Character class. One of the character inside the square brackets - a,b or c

1

Understand the Requirement: What needs to be included or excluded

2

Identify the pattern in inclusion or exclusion list

3

Final Regular Expression

foo
 moo
 coo
 doo
 poo
 loo
 boo
 hoo

m oo
 h oo

[fcndl] oo

[^mh] oo

[^abc] - Any character EXCEPT any of the one inside the square brackets, in a single

1

Understand the Requirement: What needs to be included or excluded

2

Identify the pattern in inclusion or exclusion list

3

Final Regular Expression

- joo
- moo
- koo
- loo
- poo
- zoo
- moo
- hoo

- j oo
- k oo
- l oo
- m oo

$[jklm]$ oo

$[j-m]$ oo

[a-c] - One of the character falling in the range given in square brackets

1

Understand the Requirement: What needs to be included or excluded

2

Identify the pattern in inclusion or exclusion list

3

Final Regular Expression

- joo
- moo
- koo
- loo
- poo
- moo
- zoo
- hoo

- j oo
- k oo
- l oo
- m oo
- z oo

anything in j,k,l,m & z

$[j-mz]$ oo

[a-cx] - One of the character falling in the range given in square brackets OR any of the other choices given in square brackets - a,b, c,x

1

Understand the Requirement: What needs to be included or excluded

2

Identify the pattern in inclusion or exclusion list

3

Final Regular Expression

- joo
- moo
- Koo
- Loo
- poo
- moo
- zoo
- hoo

<input checked="" type="checkbox"/> j	oo
<input checked="" type="checkbox"/> K	oo
<input checked="" type="checkbox"/> L	oo
<input checked="" type="checkbox"/> m	oo
<input checked="" type="checkbox"/> z	oo

Anything in j, k, l, m, J, K, L, M Σ_j

$[j-mJ-Mz] \Sigma_0$

[a-cACx] - One of the character falling in the range given in square brackets OR any of the other choices given in square brackets - a,b, c,A,B,C,x

1

Understand the Requirement: What needs to be included or excluded

yx
 yxxx

xxxx.yyy

xx.yyyy

x.yy

xy

xx yy

yy xx

2

Identify the pattern in inclusion or exclusion list

xxx	.	yy
xx	.	yyy
x	.	yy
	.	

3

Final Regular Expression

don't use it as a wildcard qt as a period Σ_{any}

$x^* \backslash \cdot y^*$

If a '.' is inside square brackets, it need not to be escaped

1

Understand the Requirement: What needs to be included or excluded

2

Identify the pattern in inclusion or exclusion list

3

Final Regular Expression

x#y

x:y

x.y

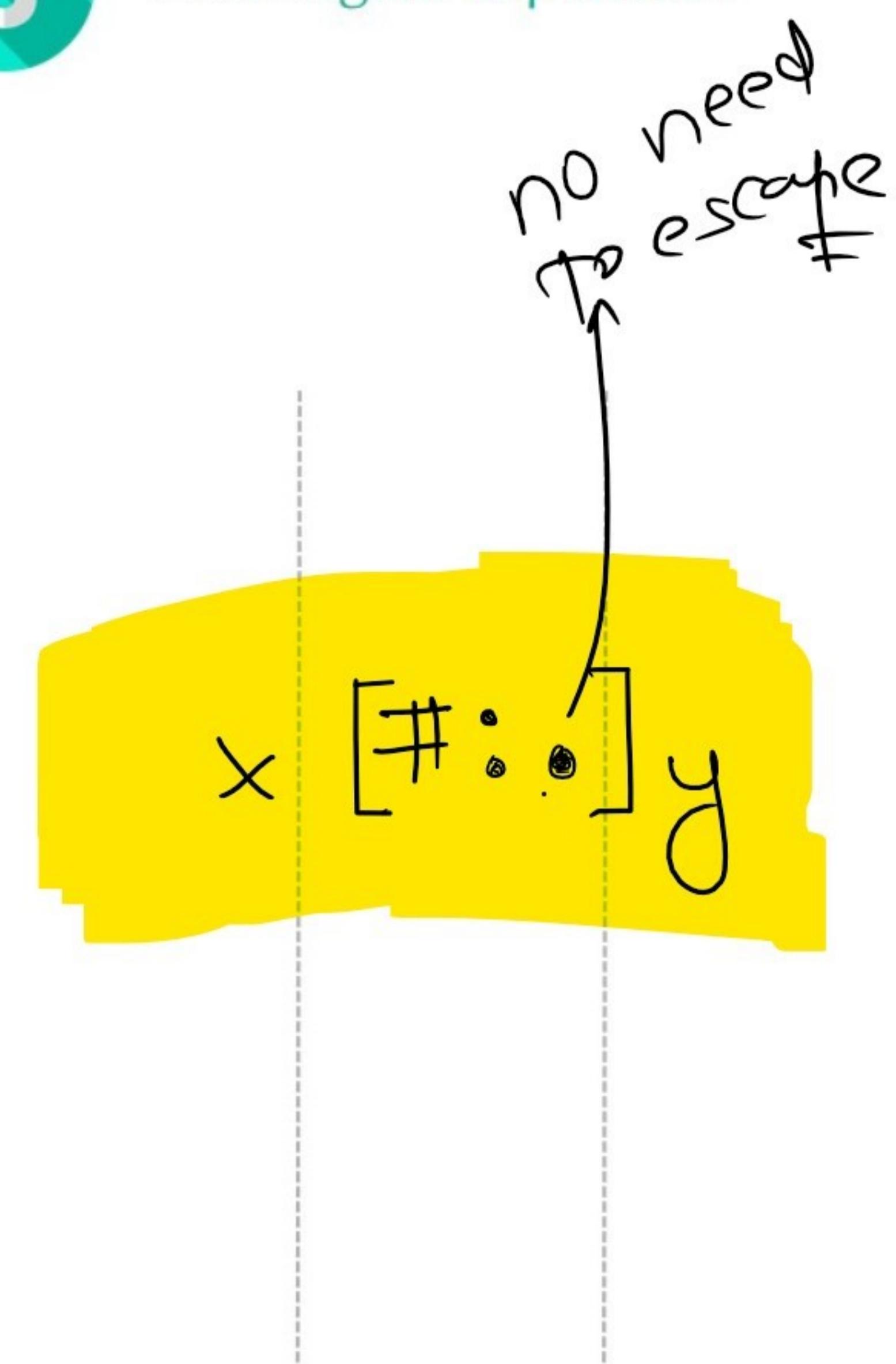
x&y

x%y

x | # - y

x | : - y

x | . - y



If a '.' is inside square brackets, it need not to be escaped

1

Understand the Requirement: What needs to be included or excluded

2

Identify the pattern in inclusion or exclusion list

3

Final Regular Expression

x#y

x:y

x^y

x&y

x%y

x | # - y

x | : - y

x | ^ - y



If a '^ - ' is inside square brackets, it need to be escaped with backslash

Understand the Requirement: What needs to be included or excluded

2

Identify the pattern in inclusion or exclusion list

3

Final Regular Expression

x#y

x\y

x^v

x&v

x%v

x # y

x ✓ y

X ----- ^ ----- V

$x [\# \backslash\backslash \wedge^y] y$

If a '\' is inside square brackets, it need to be escaped with another backslash

Understand the Requirement: What needs to be included or excluded

2

Identify the pattern in inclusion or exclusion list

3

Final Regular Expression

- foo bar baz
- bar foo baz
- baz foo bar
- bar baz foo
- foo baz bar
- baz bar foo

foo bar baz

foo | baz bar

, starts with

^ is a placeholder that signifies beginning of line. Inside [] a **^** means negation, but outside brackets it acts as an anchor

1

Understand the Requirement: What needs to be included or excluded

2

Identify the pattern in inclusion or exclusion list

3

Final Regular Expression

- foo bar baz
- bar foo baz
- baz foo bar
- bar baz foo
- foo baz bar
- baz bar foo

- baz foo bar
- foo baz bar

$\cdot^* \text{bar} \$$

denotes the
end of
string

\$ is a placeholder which signifies end of line

1

Understand the Requirement: What needs to be included or excluded

2

Identify the pattern in inclusion or exclusion list

3

Final Regular Expression

- foo
- bar foo
- baz foo
- bar baz foo
- foo baz bar
- baz bar foo

- foo

$^ \text{foo} \$$

$^$ signifies start of the line ; \$ is a placeholder which signifies end of line

Extended Set

Symbol	What it represents?
$+_{\wedge} \curvearrowleft -^n$	One or more occurrences of the character that precedes + symbol
$? \rightarrow 0^{-1}$	Zero or one occurrence of the character that precedes ?
pat1 pat2	Match either the pattern pat1 or pattern pat2
()	Divides the pattern into groups
{m}	Exactly 'm' occurrences of whatever precedes
{m,n}	Atleast m and atmost n occurrences of whatever precedes

1

Understand the Requirement: What needs to be included or excluded

2

Identify the pattern in inclusion or exclusion list

3

Final Regular Expression

- 834
- 519
- 4874
- 5
- 89
- 45687
- 25
- 645

<input checked="" type="checkbox"/>	\wedge	[0-9][0-9][0-9]	\$
<input checked="" type="checkbox"/>	\wedge	[0-9][0-9][0-9]	\$
<input checked="" type="checkbox"/>	\wedge	[0-9][0-9][0-9]	\$

$\wedge [0-9]\{3\}\$$

a{m} represents exactly 'm' repetitions of whatever immediately precedes this

1

Understand the Requirement: What needs to be included or excluded

2

Identify the pattern in inclusion or exclusion list

3

Final Regular Expression

- lion
- tiger
- leopard
- fox
- kangaroo
- cat
- mouse
- cuckoo
- deer

<input checked="" type="checkbox"/> ^	[a-z]{4}	\$
<input checked="" type="checkbox"/> ^	[a-z]{5}	\$
<input checked="" type="checkbox"/> ^	[a-z]{5}	\$
<input checked="" type="checkbox"/> ^	[a-z]{6}	\$
<input checked="" type="checkbox"/> ^	[a-z]{4}	\$

$\wedge [a-z]^{4,6} \$$

a{m,n} represents atleast 'm' and atmost 'n' repetitions of whatever immediately precedes this

1

Understand the Requirement: What needs to be included or excluded

2

Identify the pattern in inclusion or exclusion list

3

Final Regular Expression

- ha
- hahahahaha
- hahaha
- hahaha
- haha
- hahahahaha
- hahahahahahaha
- hahahahahahahaha

<input checked="" type="checkbox"/> ha{5}
<input checked="" type="checkbox"/> ha{4}
<input checked="" type="checkbox"/> ha{6}
<input checked="" type="checkbox"/> ha{8}
<input checked="" type="checkbox"/> ha{9}

$(ha)^{4,9}$

**paranthesis is used for grouping and treating as a single entity
 $\{m,\}$ represents atleast m repetitions of whatever precedes**

1

Understand the Requirement: What needs to be included or excluded

2

Identify the pattern in inclusion or exclusion list

3

Final Regular Expression

fooaaaabar
 fooabar
 foobar
 fooxxxbar
 fooxbar
 foo aabar

<input checked="" type="checkbox"/> foo	aaaa	bar
<input checked="" type="checkbox"/> foo	a	bar
<input checked="" type="checkbox"/> foo	aa	bar

1 or more repetitions

foo a+ bar

a+ One or more occurrences of 'a'

1

Understand the Requirement: What needs to be included or excluded

2

Identify the pattern in inclusion or exclusion list

3

Final Regular Expression

https://website
 http://website
 https://website
 http://website
 http://website

<input checked="" type="checkbox"/> http	s	://website
<input checked="" type="checkbox"/> http		//website

Zero or One Occurrence

http s? ://website

a? Zero or One occurrence of 'a'

1

Understand the Requirement: What needs to be included or excluded

2

Identify the pattern in inclusion or exclusion list

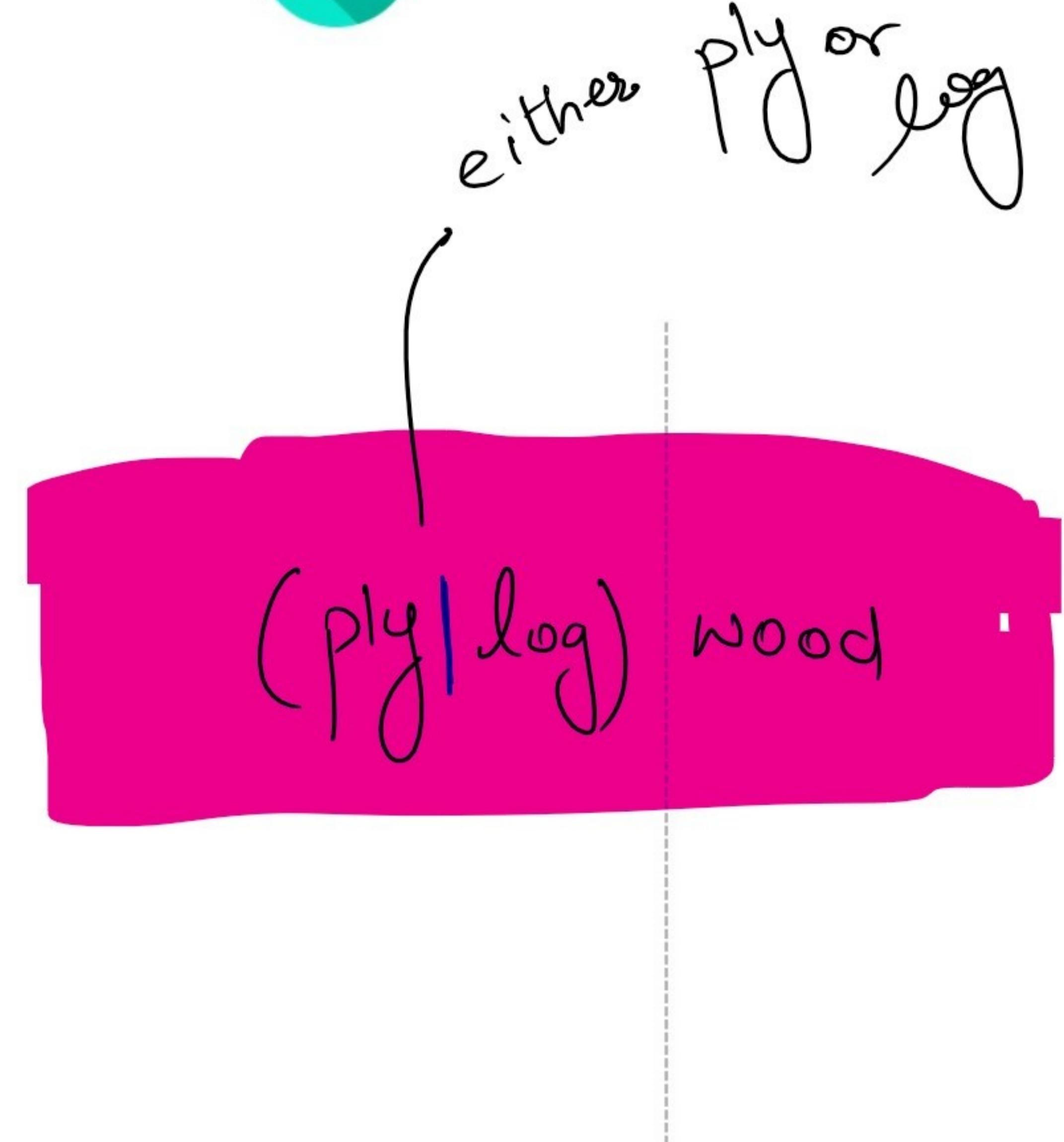
3

Final Regular Expression

redwood
 logwood
 sapwood
 rosewood
 plywood
 teakwood

log
 ply

wood
wood



(a|b) represents either a or b, where a and b can be multi character strings

\A - Matches if the specified characters are at the start of a string.

Expression	String	Matched?
\Athe	the sun	Match
\Athe	In the sun	No match

\Z - Matches if the specified characters are at the end of a string.

Expression	String	Matched?
I like Python	I like Python	1 match
Python\Z	I like Python Programming	No match
Python\Z	Python is fun.	No match

\b - Matches if the specified characters are at the beginning or end of a word.

Expression	String	Matched?
\bfootball	football	Match
\bfootball	a football	Match
\bfootball	afootball	No match
\bfootball	the foo	Match
\bfootball	the afoo test	Match

\B - Opposite of \b. Matches if the specified characters are **not** at the beginning or end of a word.

Expression	String	Matched?
\Bfootball	football	No match
\Bfootball	a football	No match
\Bfootball	afootball	Match
\Bfootball	the foo	No match
\Bfootball	the afoo test	No match
\Bfootball	the afootest	Match

`\d` - Matches any decimal digit. Equivalent to `[0-9]`

Expression	String	Matched?
------------	--------	----------

<code>\d</code>	<code>12abc3</code>	3 matches (at <code>12abc3</code>)
	<code>Python</code>	No match

`\D` - Matches any non-decimal digit. Equivalent to `[^0-9]`

Expression	String	Matched?
------------	--------	----------

<code>\D</code>	<code>1ab34"50</code>	3 matches (at <code>1ab34"50</code>)
	<code>1345</code>	No match

`\s` - Matches where a string contains any whitespace character. Equivalent to `[\t\n\r\f\v]`.

Expression	String	Matched?
------------	--------	----------

<code>\s</code>	<code>Python RegEx</code>	1 match
	<code>PythonRegEx</code>	No match

`\S` - Matches where a string contains any non-whitespace character. Equivalent to `[^ \t\n\r\f\v]`.

Expression	String	Matched?
------------	--------	----------

<code>\S</code>	<code>a b</code>	2 matches (at <code>a b</code>)
	<code></code>	No match

`\w` - Matches any alphanumeric character (digits and alphabets). Equivalent to `[a-zA-Z0-9_]`. By the way, underscore `_` is also considered an alphanumeric character.

Expression	String	Matched?
<code>\w</code>	<code>12&" : ;c</code>	3 matches (at <code>12&" : ;c</code>)
	<code>%"> !</code>	No match

`\W` - Matches any non-alphanumeric character. Equivalent to `[^a-zA-Z0-9_]`

Expression	String	Matched?
<code>\W</code>	<code>1a2%c</code>	1 match (at <code>1a2%c</code>)
	<code>Python</code>	No match

Email Pattern

1. It should have one @ symbol in between
2. Before @ it can be any number of a-z,A-Z,_,,
3. After @ there should be minimum one number of a-z,A-Z,0-9,-
4. After @ and previous combination there should be minimum one period(.) sign
5. It should end with either com,org or net

Indian Mobile Number Pattern

1. It should have 10 numbers
2. Starting number should be either 7,8, or 9

Email Pattern

$^[[A-Za-z][A-Za-z0-9_]+ @[[A-Za-z0-9_]+ \backslash.(com|org|net)]$

1-n

1-n

Zartab@codewithz.com

zartab.n@uni.org

zartab-n-123@my-company.net

Indian Mobile Number Pattern

$[0-9]^{10}$

X

$[7-9]^{1} [0-9]^{9}$

Object Orientation

```
numbers = [1, 2, 3]  
print(type(numbers))  
numbers[1]  
numbers.append(4); ✓  
numbers.fly(); X
```

<class 'list'>

→ blueprint of what all things
a variable which belongs to
the list can do
class

because the fly() is not defined
inside class list.

Point

- draw()
- move()
- get_distance()

shopping-cart

- add()
- remove()
- get_price(product)

Class → template or a blueprint which defines the features the object will hold.

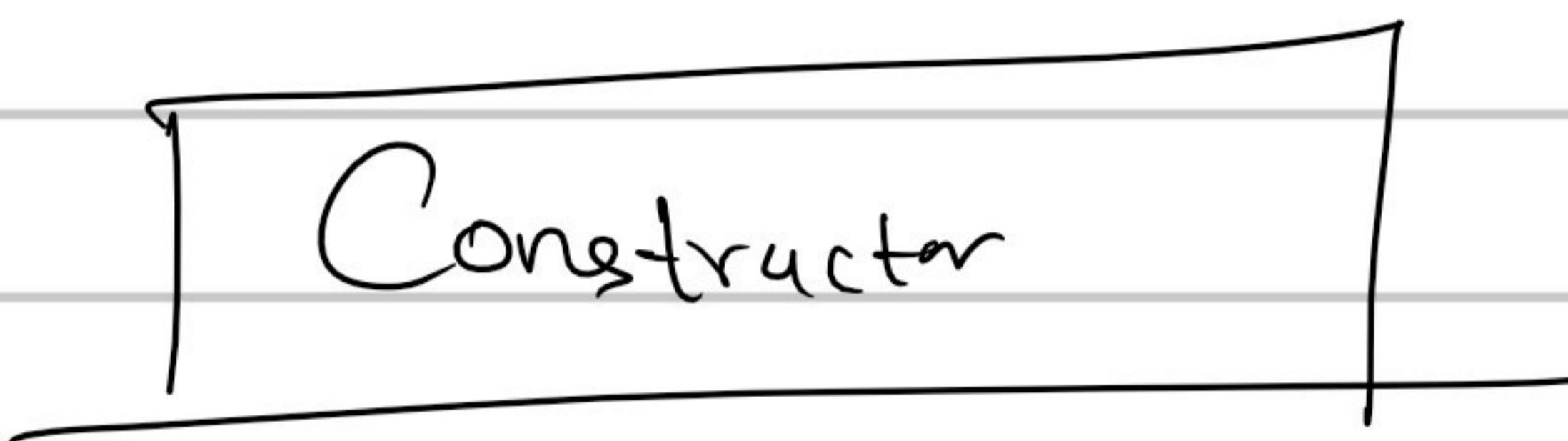
Object → instance of a class

Class → Human

Object → John, Mary, Jason

class Point:
 def draw(self):
 print("Something");
 not a keyword
 reference to the current object
 will be assigned to self
 it is compulsory to write a self referring object to be the first parameter in any function

p.draw(p);



class Point:
 def __init__(self):
 represents a constructor in Python

