

In [9]: 1 type(a)

Out[9]: int

Registers

## Mutability / Immutability in Python

In [10]: 1 a = 3  
2 print(a)

3

In [12]: 1 print(id(a)) # unique value / address of object a

140637764774256

In [14]: 1 a = 5  
2 print(a)

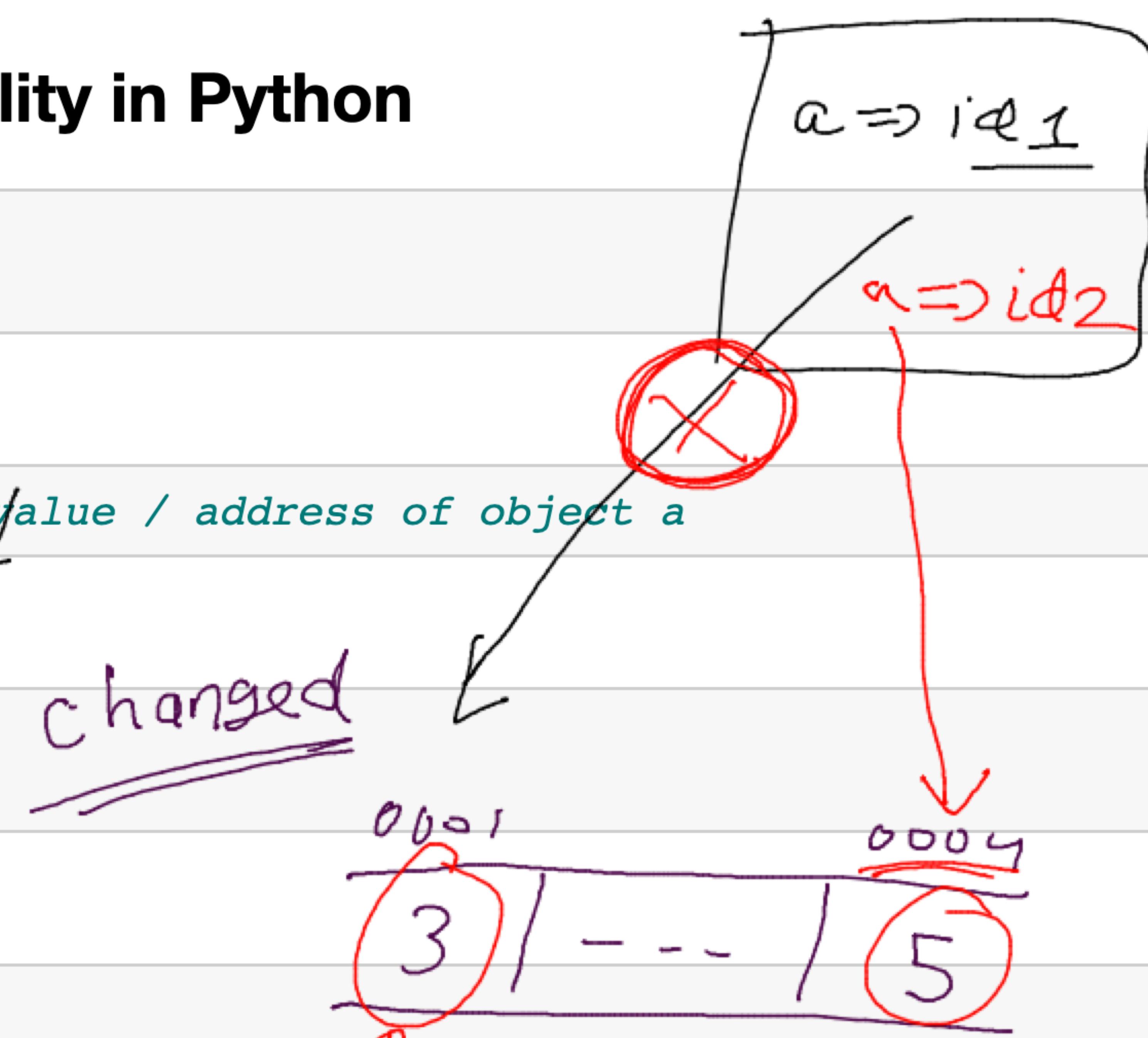
5

In [15]: 1 print(id(a))

140637764774320

1

1



will be deleted  
by garbage collector,



In [14]:

```
1 a = 5
2 print(a)
```

5

In [15]:

```
1 print(id(a))
```

140637764774320

## List

mutable

In [16]:

```
1 a = [2, 5, 6]
2 print(id(a))
```

140636690961152

In [17]:

```
1 a[0] = 3
2 print(a)
```

[3, 5, 6]

[3  
X, 5, 6]

In [18]:

```
1 print(id(a))
```

140636690961152

In [ ]:

1



2.5

In [30]: 1 print(3 \*\* 2)

9

In [31]: 1 print(3 \* 2)

6

In [33]: 1 print(3 % 2) # remainder when 3 divided by 2

1

In [34]: 1 "i" + "am" + "inevitable!"

Out[34]: 'iaminevitable!'

In [37]: 1 "random"\*2\*3

Out[37]: 'randomrandomrandomrandomrandomrandom'

In [ ]:

1

In [ ]:

1

In [ ]:

1



2.5

In [30]: 1 `print(3 ** 2)`

9

In [31]: 1 `print(3 * 2)`

6

In [33]: 1 `print(3 % 2) # remainder when 3 divided by 2`

1

In [34]: 1 `"i" + "am" + "inevitable!"`

Out[34]: 'iaminevitable!'

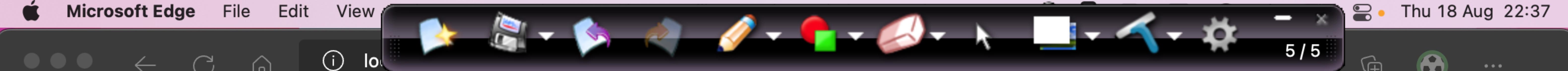
In [37]: 1 `"random"*2*3`

Out[37]: 'randomrandomrandomrandomrandomrandom'

In [ ]: 1

In [ ]: 1

In [ ]: 1



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In [53]: 1 \_ = "what???"

In [54]: 1 print(\_)

what???

BoDMAS

In [1]: 1 3 + 4

Out[1]: 7

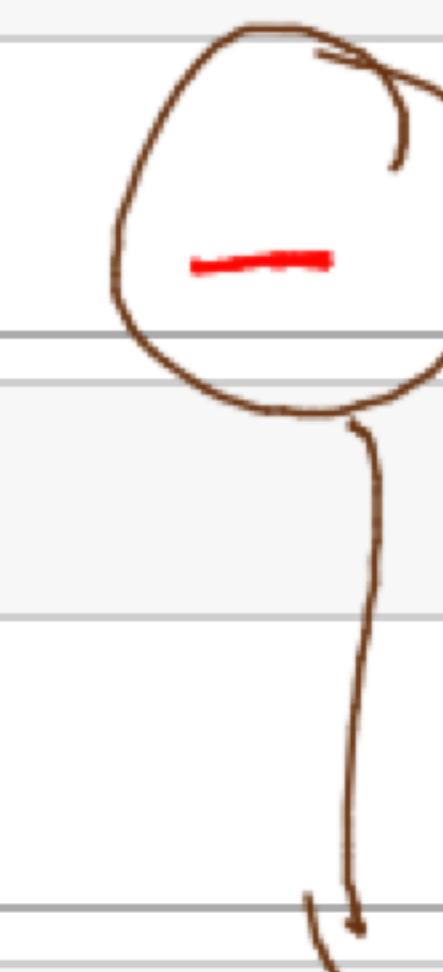
In [2]: 1 print(\_)

7

In [4]: 1 5 + 6

Out[4]: 11

expression

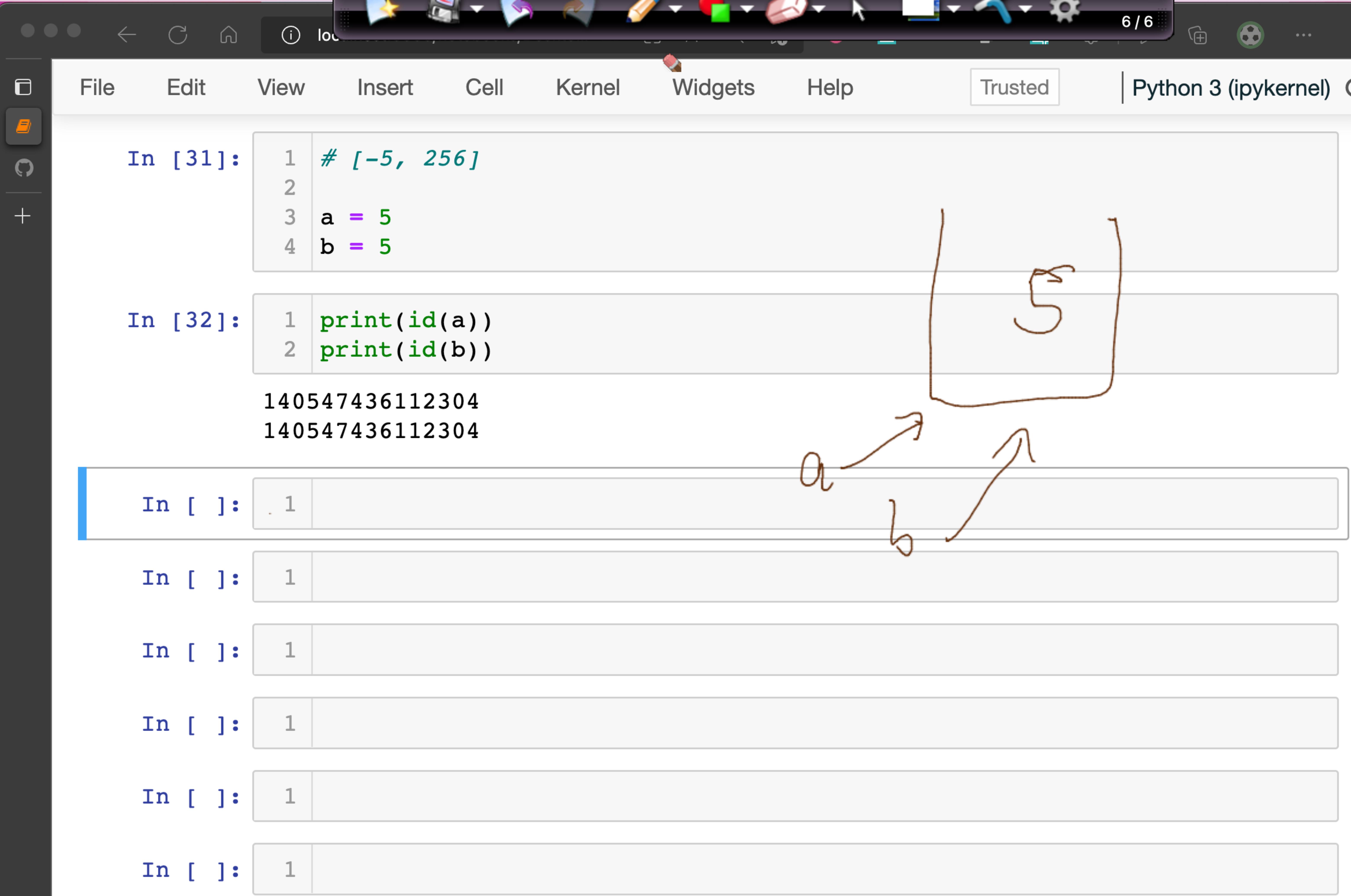


In [6]: 1 print(\_) # \_ is a special identifier, it stores the values of last  
2 # evaluated expression

11

In [ ]:

1





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140547436112304  
140547436112304

In [34]: 1 `id(a) == id(b)`

Out[34]: True

In [35]: 1 `b = 7`  
2 `c = 8`  
3 `id(b) == id(c)`

Out[35]: False

In [36]: 1 `d = 7`  
2 `e = 7`  
3 `print(id(b))`  
4 `print(id(d))`  
5 `print(id(e))`

140547436112368  
140547436112368  
140547436112368

In [ ]: 1

[-5, 2 56]

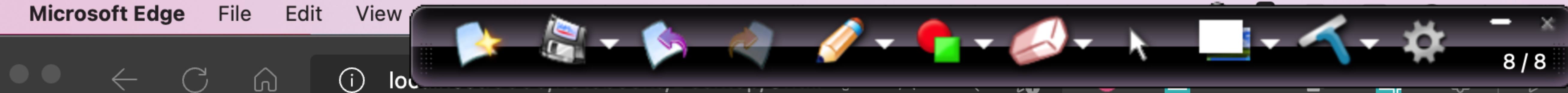
[-5] | [5]

7

8

d

e



## Control Flow

In [43]:

```
1 if True:  
2     print('I am true!')  
3     print(2 + 3)
```

I am true!

5



Tea / Coffee

In [44]:

```
1 a = 50  
2  
3 if a > 60: X  
4     print('I am true!') ↴  
5 else:  
6     print('I am false!')
```

Tea powder

I am false!

In [ ]:

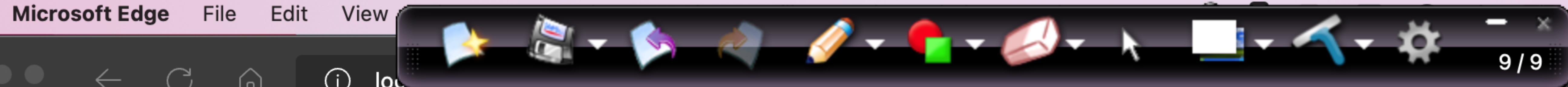
1

In [ ]:

1

In [ ]:

1



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I am false!

In [46]:

```
1 a = 50
2 a > 60 # comparison operator
```

Out[46]: False

In [48]:

```
1 # multiple conditions
```

In [49]:

```
1 a = 50
2
3 if a > 60: ✗
4     print('I am true')
5 elif a > 40:
6     print('Now I am also true!')
7 else:
8     print('I am false!') ↵
```

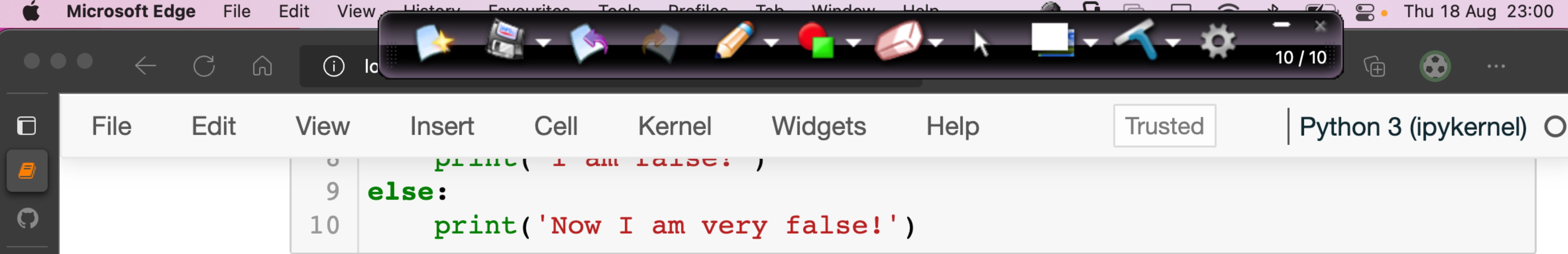
So > 40 ✓

Now I am also true!

In [ ]:

In [ ]:

In [ ]:



In [52]:

```
1 a = 60
2
3 if a > 50: ✓
4     print("FIRST")
5 if a > 40: ✓
6     print("SECOND")
```

FIRST

SECOND

In [54]:

```
1 a = 60
2
3 if a > 50: # True ✓
4     print("FIRST")
5 elif a > 40: # Not even checked
6     print("SECOND")
```

FIRST

In [ ]:

1

A screenshot of a Microsoft Edge browser window displaying a Jupyter Notebook interface. The browser's top bar shows tabs for Microsoft Edge, File, Edit, View, History, Favourites, Tools, Profiles, Tab, Window, Help, and a date/time indicator. The Jupyter notebook menu bar includes File, Edit, View, Insert, Cell, Kernel, Widgets, and Help. A status bar at the bottom right shows "Trusted" and "Python 3 (ipykernel)".

The notebook displays the following code in a cell:

```
3 if a > 50:  
4     print("FIRST")  
5 if a > 40:  
6     print("SECOND")
```

The output of this code is:

FIRST  
SECOND

In [54]:

```
1 a = 60  
2  
3 if a > 50: # True  
4     print("FIRST")  
5 elif a > 40: # Not even checked  
6     print("SECOND")
```

The output of this code is:

FIRST

Four additional empty input cells are shown below:

In [ ]: 1

In [ ]: 1

In [ ]: 1

In [ ]: 1

File Edit View Insert Cell Kernel Widgets Help Trusted Python 3 (ipykernel) ○

In [76]: 1 print(isinstance(True, object))

True

In [77]: 1 print(isinstance(False, object))

True

In [80]: 1 l = [1, 2, 3, 4, 5]  
2 print(l)

[1, 2, 3, 4, 5]

In [83]: 1 l = ['hello', print, 4.5, 6, True, [3, 4]]

In [84]: 1 print(l)

['hello', <built-in function print>, 4.5, 6, True, [3, 4]]

In [ ]: 1

In [ ]: 1

In [ ]: 1

File Edit View Insert Cell Kernel Widgets Help Trusted Python 3 (ipykernel) ○

In [89]: 1 l = [1, 2, print, 4.5]

In [94]: 1 print(l[2])  
<built-in function print>

In [95]: 1 l[2]

Out[95]: <function print>

In [96]: 1 type(l[2])  
Out[96]: builtin\_function\_or\_method

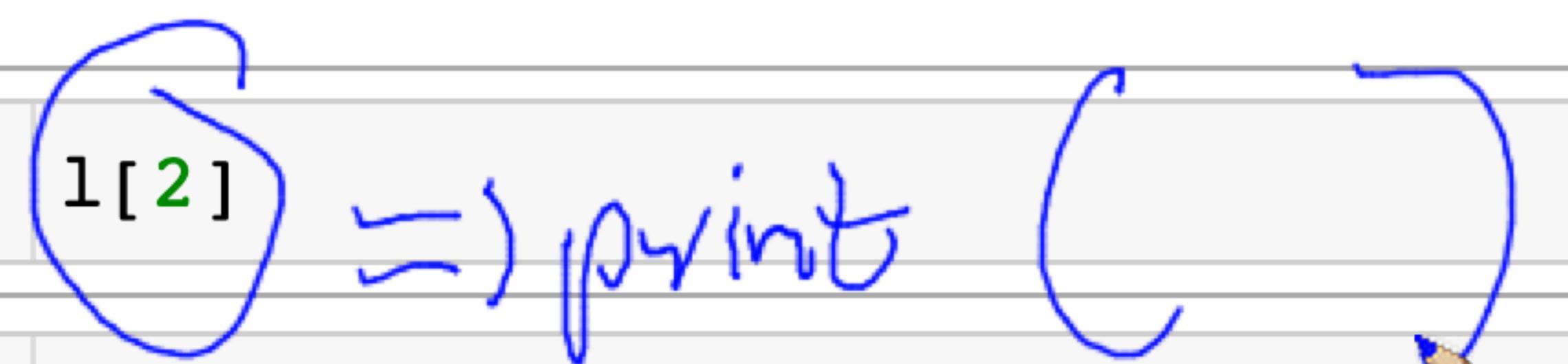
In [ ]: 1 l[2] => print C

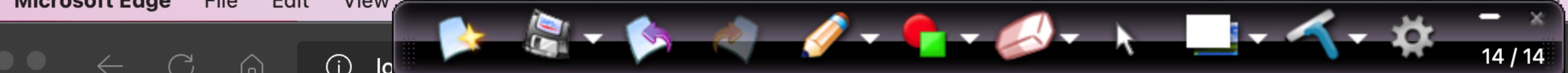
In [ ]:

In [ ]:

In [ ]:

Tn [ ]:





Notebook saved

Trusted

14 / 14



...

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In [89]: `l = [1, 2, print, 4.5]`

In [94]: `1 print(l[2])`

`<built-in function print>`

In [95]: `1 l[2]`

Out[95]: `<function print>`

In [96]: `1 type(l[2])`

Out[96]: `builtin_function_or_method`

In [97]: `1 l[2]('hello world')`

`hello world`

$\Rightarrow \text{print}(3+6)$

In [98]: `1 l[2](3 + 6)`

`9`

In [ ]: `1`

Microsoft Edge File Edit View History Favourites Tools Profiles Tab Window Help

Notebook saved Trusted Python 3 (ipykernel)

In [100]:

```
1 a = 6
2 b = 7
3 id(a) == id(b)
```

Out[100]: False

In [101]:

```
1 # [-5, 256]
```

In [103]:

```
1 a = 6
2 print(id(a))
3 a = 8
4 print(id(a))
```

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140547436112400

In [104]:

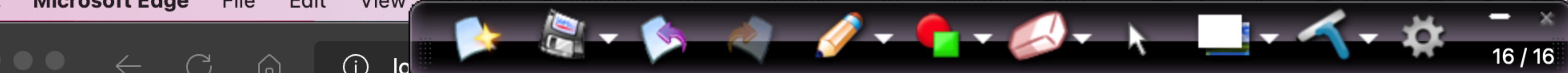
```
1 b = 8
2 print(id(8))
```

140547436112400

In [ ]:

```
1
```





File Edit View Insert Cell Kernel Widgets Help Trusted Python 3 (ipykernel)

True

In [112]:

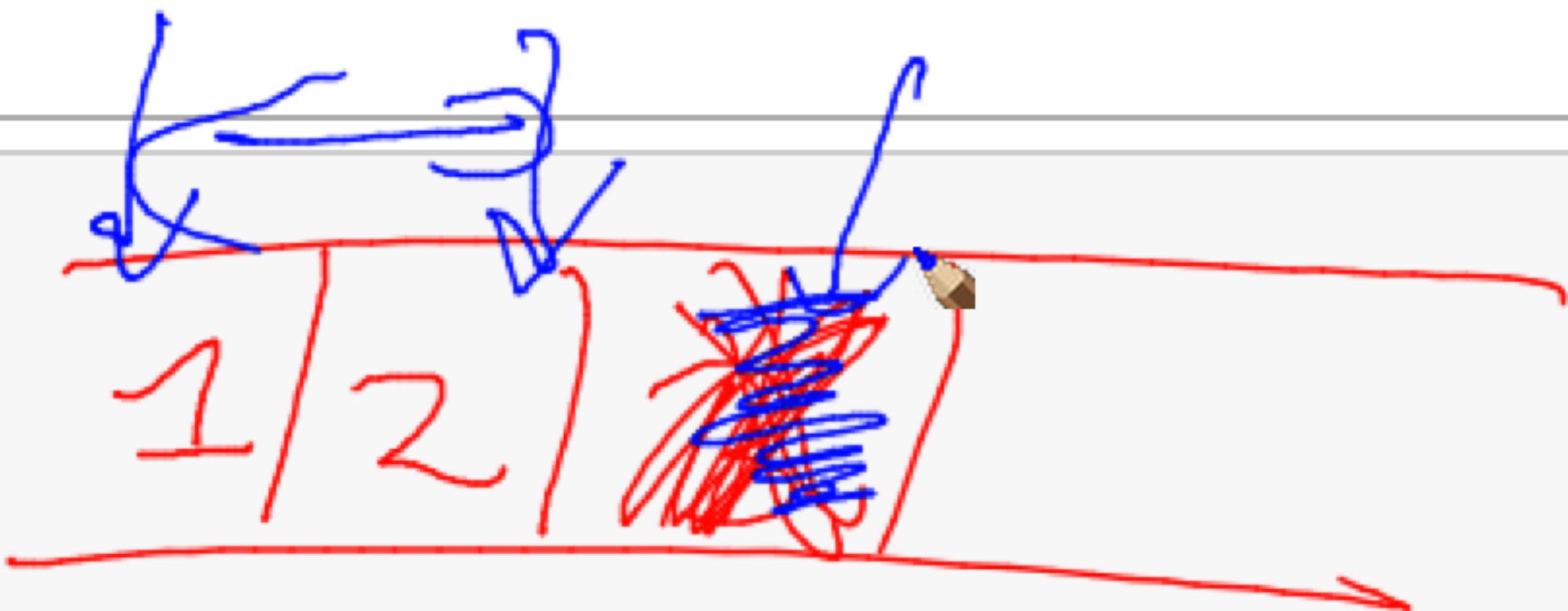
```
1 a = 3 # a is an object, also a variable
2 print(isinstance(a, object))
```

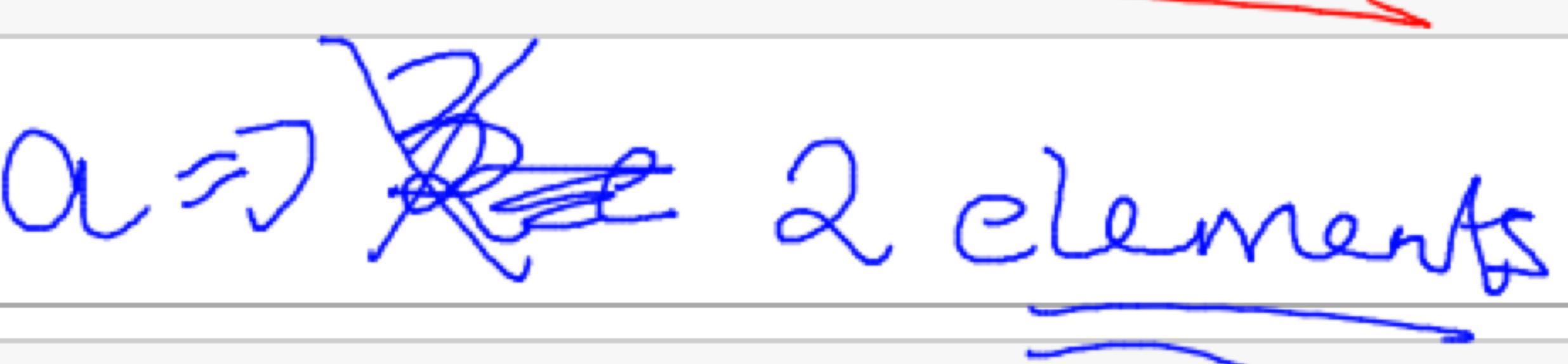
True

In [114]:

```
1 a = [1, 2, 3]
2 print(a)
3 a.pop() =>
4 print(a)
```

[1, 2, 3]  
[1, 2]





In [ ]:

In [ ]:

In [ ]:

In [ ]:

