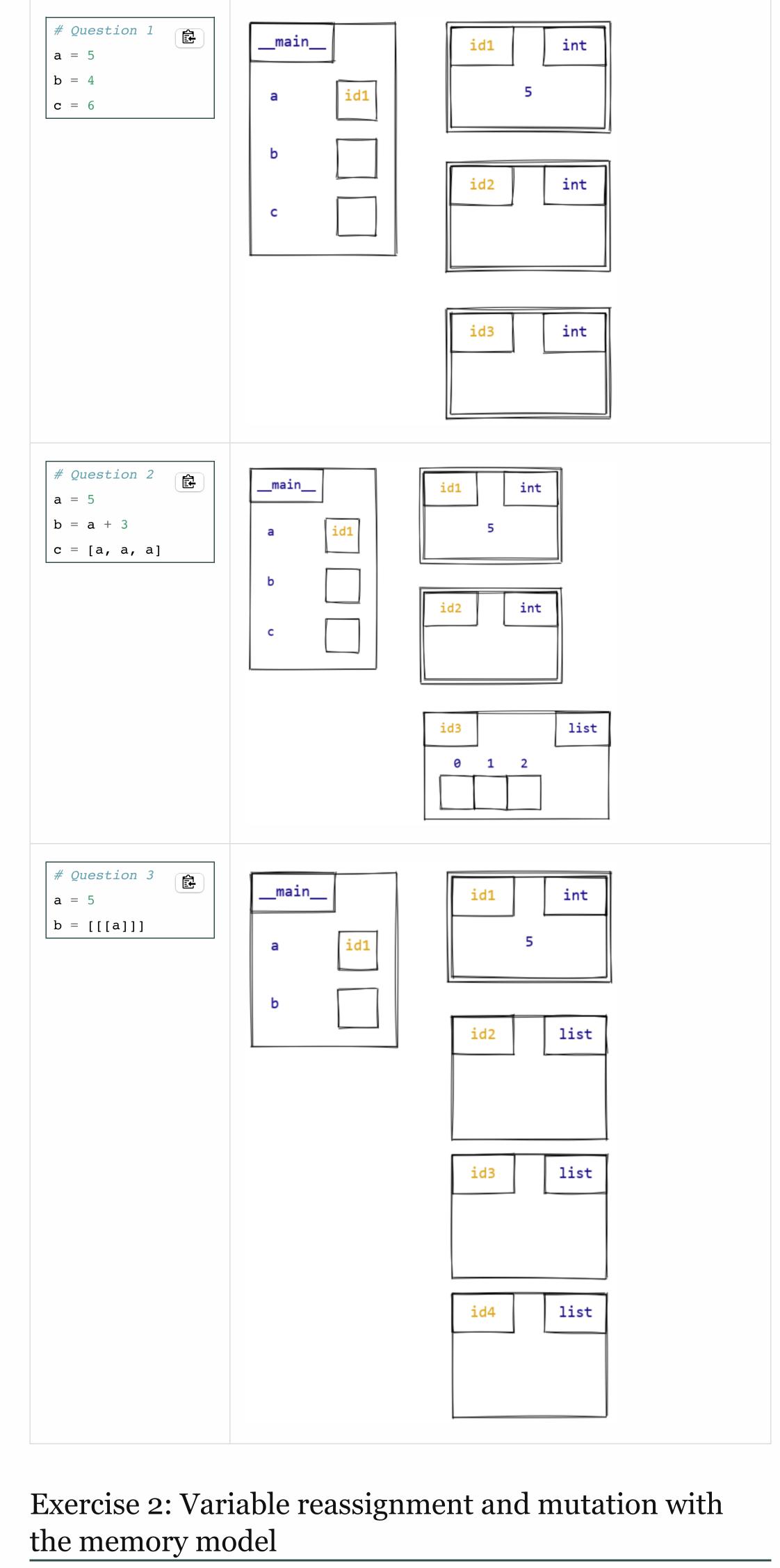
CSC110 Lecture 15: The Python Memory Model

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Exercise 1: Practice with the Python memory model

For each of the following code snippets, fill in the memory model diagram on the right to reflect the state of memory after the code is executed. In each case, we begin with the state where a has already been assigned the value 5. You may not need to use all of the boxes.



а

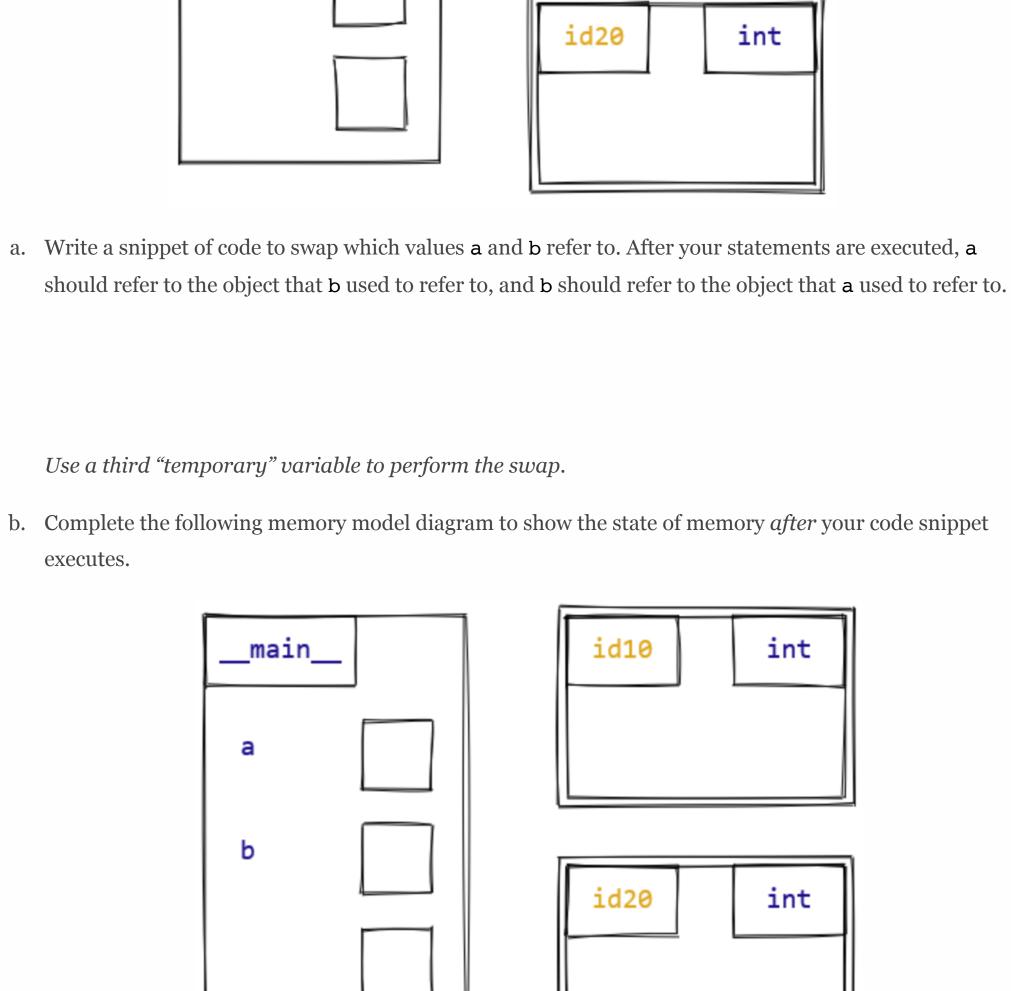
b

1. Suppose we have two variables a and b that have been assigned int values:

main

executes.

instead of ints?



id10

int

main int id13 id15 id11 str str "truffle hogs" mario_log

a. Complete the following memory model diagram to represent a variable mario_log to refer to this

2. Farmer Mario is the proud owner of 57 chickens, 18 goats, and 21 truffle hogs. He is very organized and

keeps a log of how many animals of each type he has by the end of each month.

id12

data, using an appropriate Python data type:

c. Would the code you wrote in part (a) behave correctly if a and b referred to mutable values like lists

"goats"

str

int

57

id16

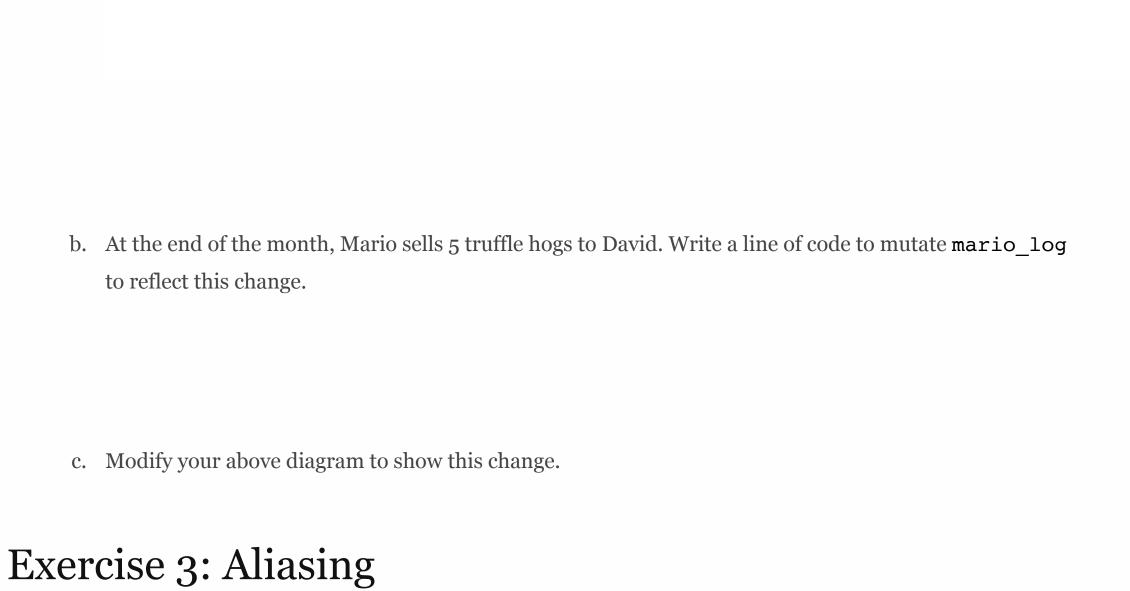
21

int

Ê

list

id14



У int int id12 id14

id13

int

For each snippet of code below, complete the memory model diagram and answer the question below it. (You

int

list

may need to indicate elements being added/removed from a collection data type.)

id11

id20

c. x == [1, 2, 3] and y == [1, 2, 3]

id12

id20

a. $x == \{1, 2, 3\}$ and $y == \{1, 2, 3, 4\}$

What is the value of lst at the end of this code snippet?

id10

id11

What is the value of lst at the end of this code snippet?

def f1(thing: list[str]) -> None:

thing = ['x', 'y'] + thing

In Python console

>>> phone = ['David']

Exercise 4: Functions and the call stack

lst = [[1, 2], [3, 4]]

item = item + [88]

for item in lst:

main

lst

item

b. $x == \{1, 2, 3, 4\}$ and $y == \{1, 2, 3, 4\}$

d. x is y

2. Consider this code

y = x

 $x = \{1, 2, 3\}$

set.add(y, 4)

expression(s).

id11 id12 id13

x = [1, 2, 3]

y = y + [4]

__main_

y = x

expression(s). a. x == [1, 2, 3] and y == [1, 2, 3, 4]b. x == [1, 2, 3, 4] and y == [1, 2, 3, 4]

After the code above is executed, which of the following expressions evaluate to True? Circle those

__main_ int id11 id13 int 1 3 У

int

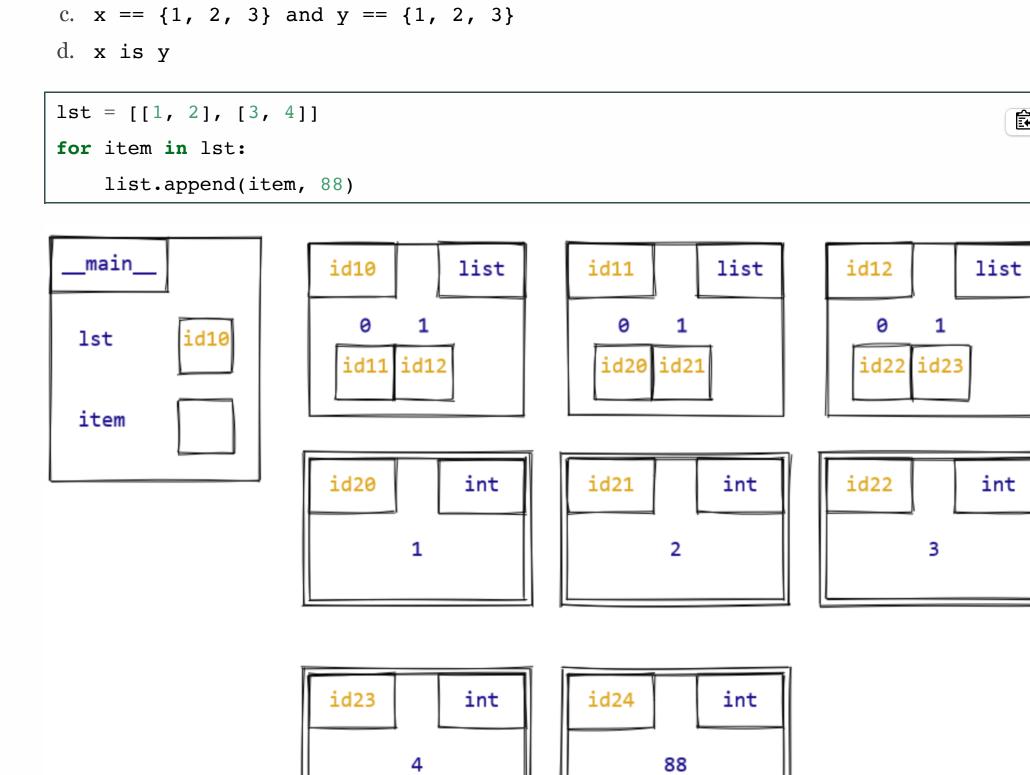
set

After the code above is executed, which of the following expressions evaluate to True? Circle those

id11 , id12 , id13 }

id14

int



id20 id22 int int int id21 id23 int id24 int

For each snippet of code below, draw the memory model diagram for the state of the program immediately

before the function (f1/f2) returns. Then, write what would be displayed in the Python console.

list

id11

id20 id21

list

id12

id22 id23

