

UNIVERSITY OF CALIFORNIA, BERKELEY
Department of Electrical Engineering and Computer Sciences
Computer Science Division

CS10 Fall 2025

TA: Victoria



SOLUTIONS

Discussion 9: Midterm Practice

Instructions:

- If you're attending this section in-person, please log into iClicker!
- If you missed this discussion, fill out this entire worksheet, and upload it to the Gradescope assignment titled "Discussion 9" by next Discussion.
- For the worksheet, you can either explain the process in words, show a screenshot, or draw the block/process.
- Please complete the Feedback Form tinyurl.com/fa25-disc-form

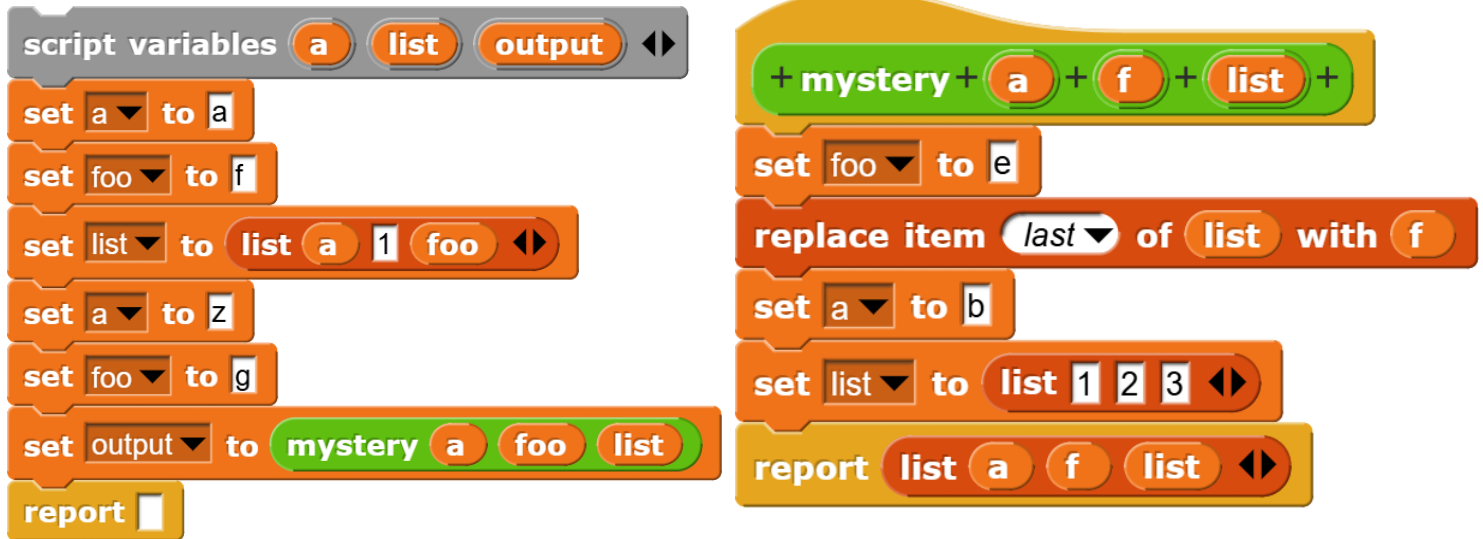
Group Activity / Question of the Day

- Do you have a favorite word? And Why? Where did you first learn it?

Required (Pages 2 - 8):

Section I - Scope

1. Determine what will be reported if the following variable was in the “report” block. You will need to trace the script to determine the outputs.

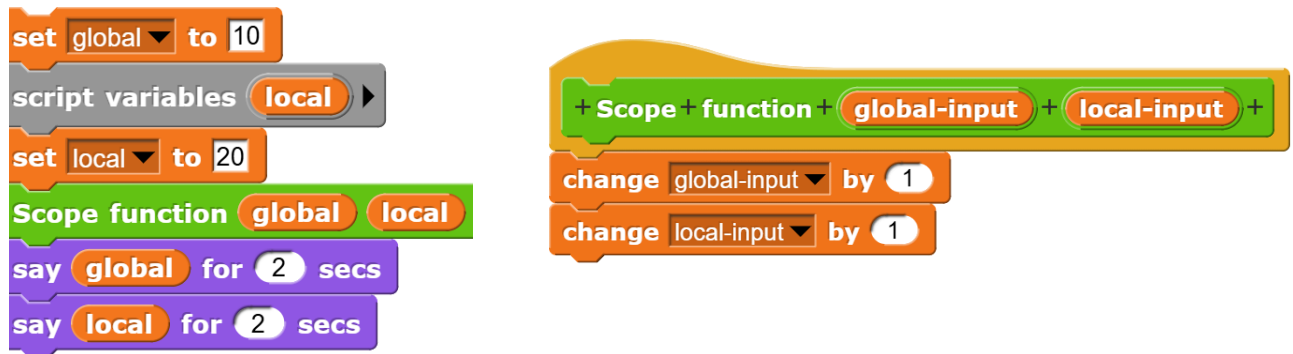


- a. report a
- b. report foo
- c. report list
- d. report output

a = z
foo = e
list = [a, 1, g]
output = [b, g, [1, 2, 3]]

1. Determine what the 'say' blocks should say for each script

a. Script 1

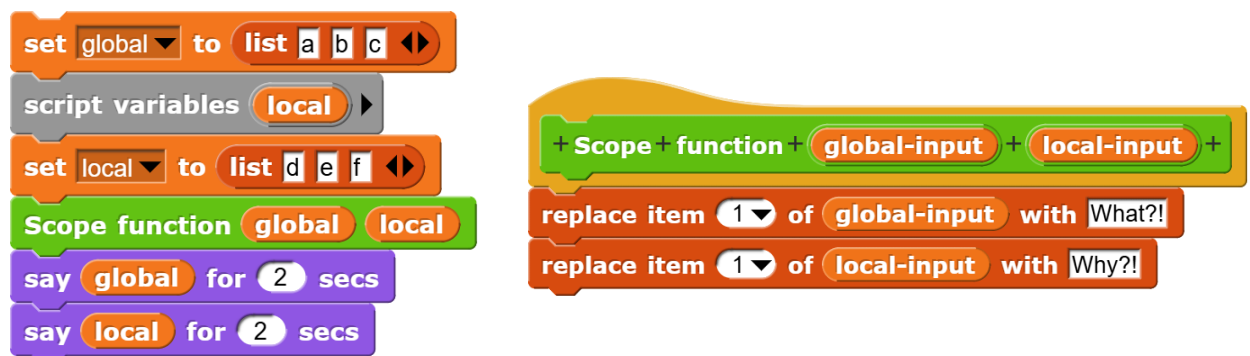


Global says 10

Local says 20

When we input the value of global and local into our scope function, because both variables store numbers – we only copy over the values. So the connection between global-input and global, and local-input and local is broken – since we cannot mutate numbers

b. Script 2



Global says: [What?!, b, c]

Local says: [Why?!, e, f]

Since global and local are both lists, global-input and local-input can modify global and input directly (they point to the same values)

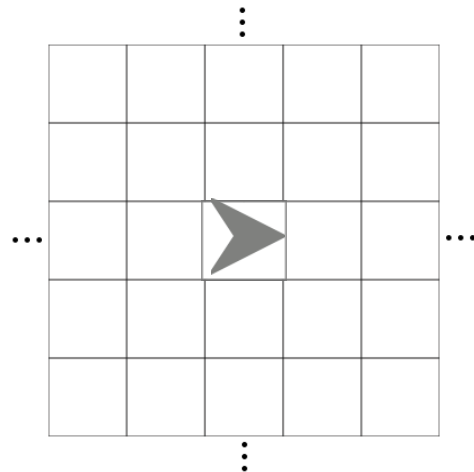
Section II – Iteration + Randomness

Here are helper blocks for controlling a robot (shaped like an arrowhead) on a grid world (infinite in both X and Y dimensions), looking down on it.

- The robot moves N squares forward in the direction it's facing.

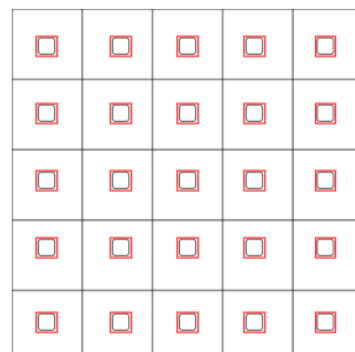


- The robot turns some number of degrees clockwise (right), in-place, about its center. (remaining in the same square).
- The robot starts in the right direction



- Fill out the grid for all possibilities of Walk(1)

- Fill out the grid for all possibilities of Walk(2)



There is a typo in this problem / solution.

I meant for the code to always walk 1 step (not N steps).

So the solution here is posted if you walk 1 step for any N

The solution if you walk N steps changes quite a bit, you get a diamond, checkered pattern still but it is just more spread out and you will have an infinitely large X (there is no longer a smallest X value)

C. Is there a pattern? If so, can you draw out the pattern as N gets larger?

Yes, it creates kind of a square/diamond pattern

D. If the center is $x=0$. What is the maximum x value to the right for any given N ?

The max is always $X=0$

Section III – Recursive Tracing

1. Trace the function.

- a. Determine what the function is doing in your own words.

What this function is doing is summing how many vowels and capital letters there are in word

- b. Determine what the function outputs if the following is inputted:

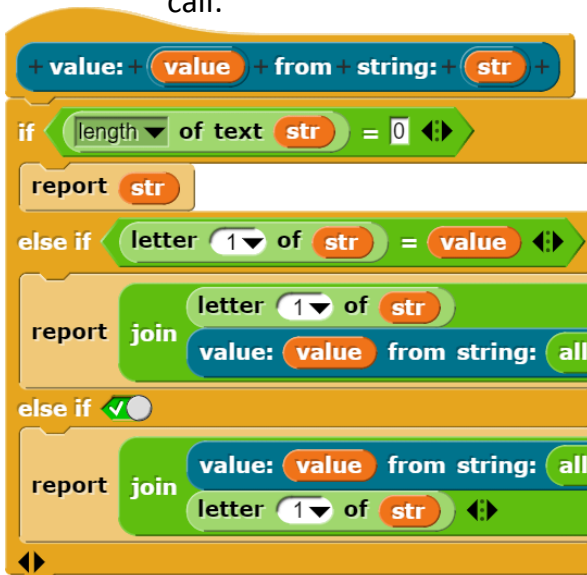
Returns 5, see slides for walkthrough



- c. What value for word would cause the function to output 3? There is more than one correct answer.

aanvi,
marius
nahee
eThan
JaclyN
Bella

- Your job is to understand and trace the function each time it is called or enters a new frame. Trace the function, and find the input value for str for that frame. By trace, we mean, figure out what the inputs are (what str is set to) for each frame. You DO NOT need to trace the value for value. You will be tracing the following call:



value: c from string: cats

Call #1: str=

Call #2: str=

Call #3: str=

Call #4: str=

Call #5: str=

- What will the final output be for:

value: c from string: cats

Csta, see slides for walkthrough

- What would the final output be

value: o from string: world

for:

odlrw

Section IV – Algorithmic Complexity

1. For each of the following scenarios, determine what the worst-case runtime would be:

- a. Count how many students raised their hands. You scan a line of N students once and tally hands up.

linear

- b. You have a list of N movies to watch this month. You want to decide which ones to include in your marathon, so you try every possible combination of movies (watch some, skip others) to see which set gives the highest total enjoyment.

Exponential

- c. You have N students and N locker numbers, all on sticky notes and shuffled. You compare every pair of notes to see if two students have the same locker.

quadratic

- d. Guess a secret number with hot/cold feedback on a fixed range. The number is somewhere from 1 to a known large maximum. You're told "higher" or "lower" after each guess; you must guarantee finding it.

log

- e. You're a security guard walking down a hallway. You scan a badge once to unlock every door in the building.

constant

- f. You are going to a party where you need to bring three different dishes. There are N different dishes you can pick up. You find every combination of

three dishes and then pick one combination of three dishes you like the best.

cubic

- g. You want to check a list of restaurants to see if each is vegetarian. Instead of going to each restaurant's website, you access a site that allows you to check at one time if all the restaurants you're interested in offer a vegetarian option.

constant

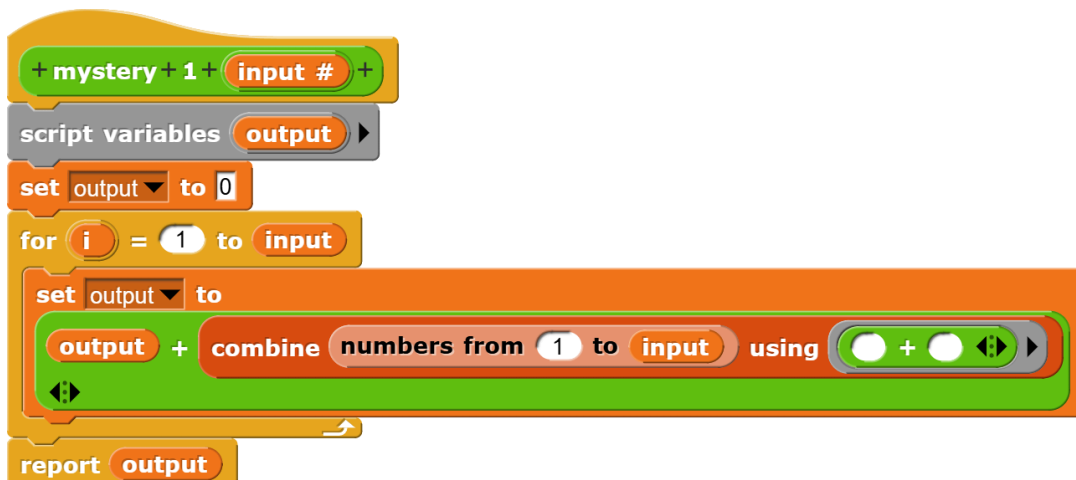
- h. You have a list of N movies released from 2000 to 2020, sorted by year. You want to find the first movie that made over \$100 million. Each time you check a movie, you jump to the middle of the remaining range. For example, you will check 2010 first.

log

2. For each function, determine the worst-case runtime.

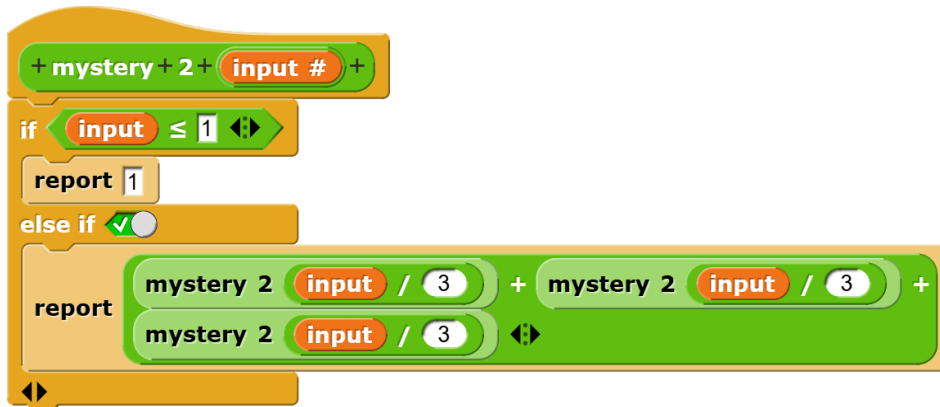
- a. Mystery 1

Quadratic, see slides for walkthrough



b. Mystery 2

linear, see slides for walkthrough



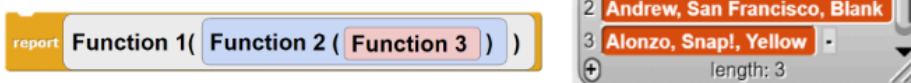
Section V – HOFs

1. Consider the following list

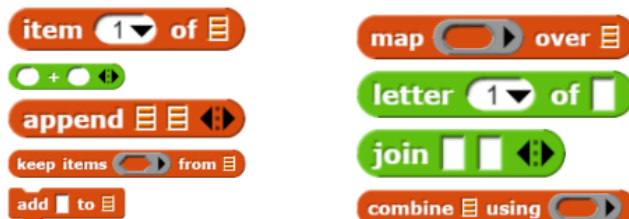


3	A	B	C
1	Victoria	Berkeley	Green
2	Andrew	San Francisco	Blank
3	Alonzo	Snap!	Yellow

The objective is to report the following flattened list using 3 functions/operations



Choose the corresponding functions that will allow us to do so



map combine using join over data

2. Using the same input list, we now want to output the list below. Circle the options below that will allow us to return the desired output (may be more than one)

3	A	B	C	D
1	Victoria	Berkeley	Green	CS10
2	Andrew	San Francisco	Blank	CS10
3	Alonzo	Snap!	Yellow	CS10

map append list join CS10 over data

map reverse of CS10 in front of reverse of over data

map list item 1 of item 2 of item 3 of join CS10 over data

combine data using map list join CS10 over data

✓ map append list join CS10 over data

✓ map reverse of CS10 in front of reverse of over data

✓ map list item 1 of item 2 of item 3 of join CS10 over data

✗ combine data using map list join CS10 over data