

# **CS10 Midterm Review Session**

Mar 18 2012

# Things to Know

- The midterm is from 6-8pm on Thursday.
- The test will be given in 155 Dwinelle Hall.
- You can have two handwritten cheat sheets (8.5x11, front and back).
- There is an ONLINE portion (in lab) and a WRITTEN portion (mentioned above).

Any questions related to readings /  
programming now?

# Readings

Pre-Quest

+

How Moore's Law Works

Free Lunch is Over\*

BtB Chapter 2, 4, 5, 6

For each of the practice problems, let's also consider the domain / range and the computational complexity.

You're welcome to make *helper blocks* if you want to.

# Warm-up Problem

Add all of the numbers that are multiples of 8 or 10 below a certain number and report the sum.

... recursively and iteratively!

# Practice Problem #1

Determine whether a number is a prime number.

Think about how to do it **iteratively** and **recursively**.

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# Practice Problem #2

Find the max of all the numbers in the input list.

max of all the numbers in



RECURSIVE max of all numbers in



# Practice Problem #3

Determine whether a number is part of the Fibonacci sequence (1, 1, 2, 3, 5, 8, 13...).

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Determine whether a number is part of the Fibonacci sequence (1, 1, 2, 3, 5, 8, 13...).

is the number  a Fibonacci number?

# Practice Problem #4

Find the words in a list that have the most vowels. Do not alter the original list.

\* note: BYOB won't be quick with this one if you do it recursively.

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Find the words in a list that have the most vowels. Do not alter the original list.

get vowel-maxing words from



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# Practice Problem #5

Find the two factors of a number that have the smallest difference.

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# Practice Problem #6

I want to go up a flight of stairs that has  $n$  steps. I can either take 1 or 2 steps each time. How many ways can I go up the flight of stairs?



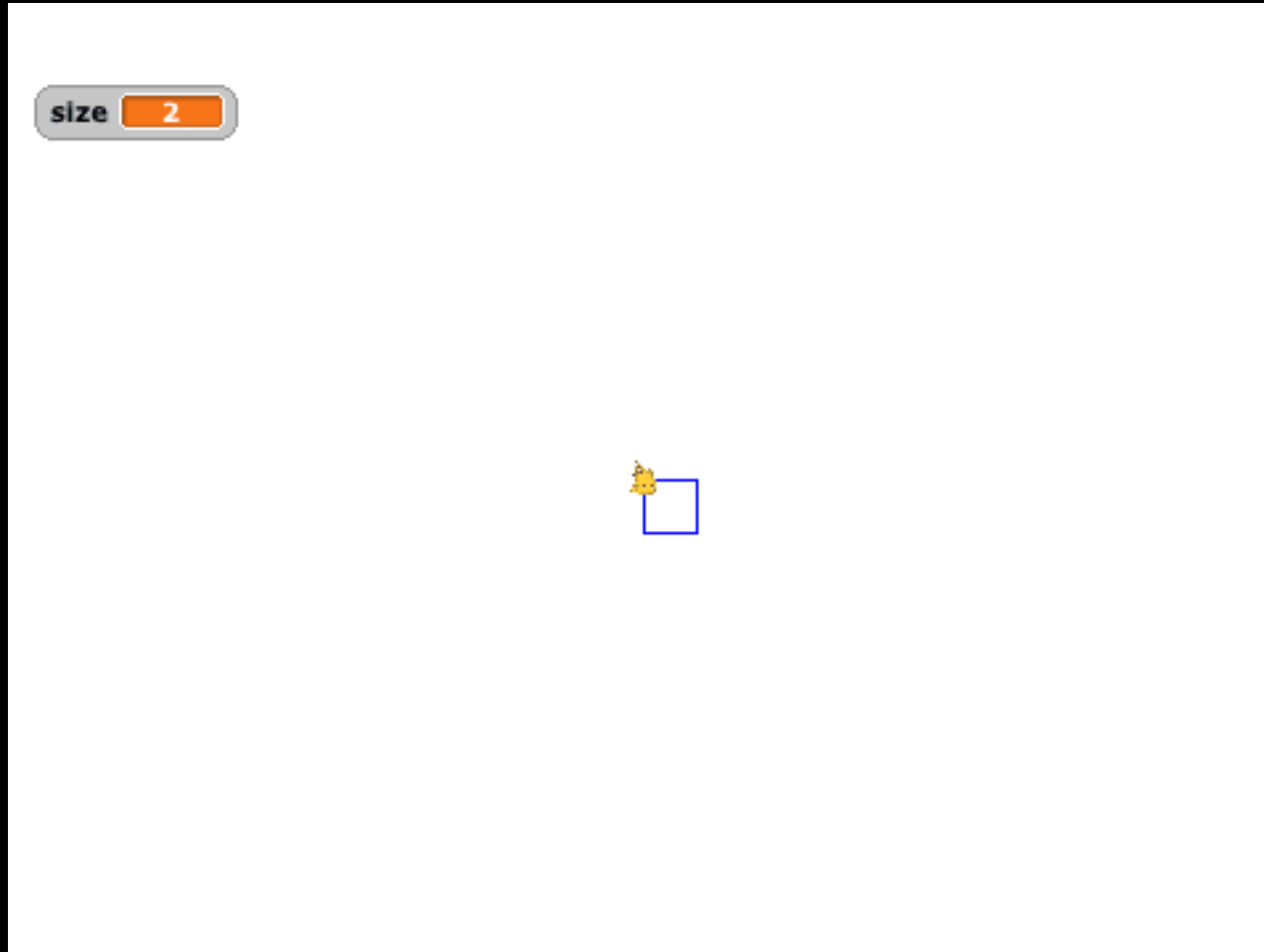
# Practice Problem #7

Your family's original ancestor was named Margo the Fertile. She has given birth to more people in your family than any other family member since her time. As generations pass and Margo's genes are diluted, your family becomes less fertile over time.

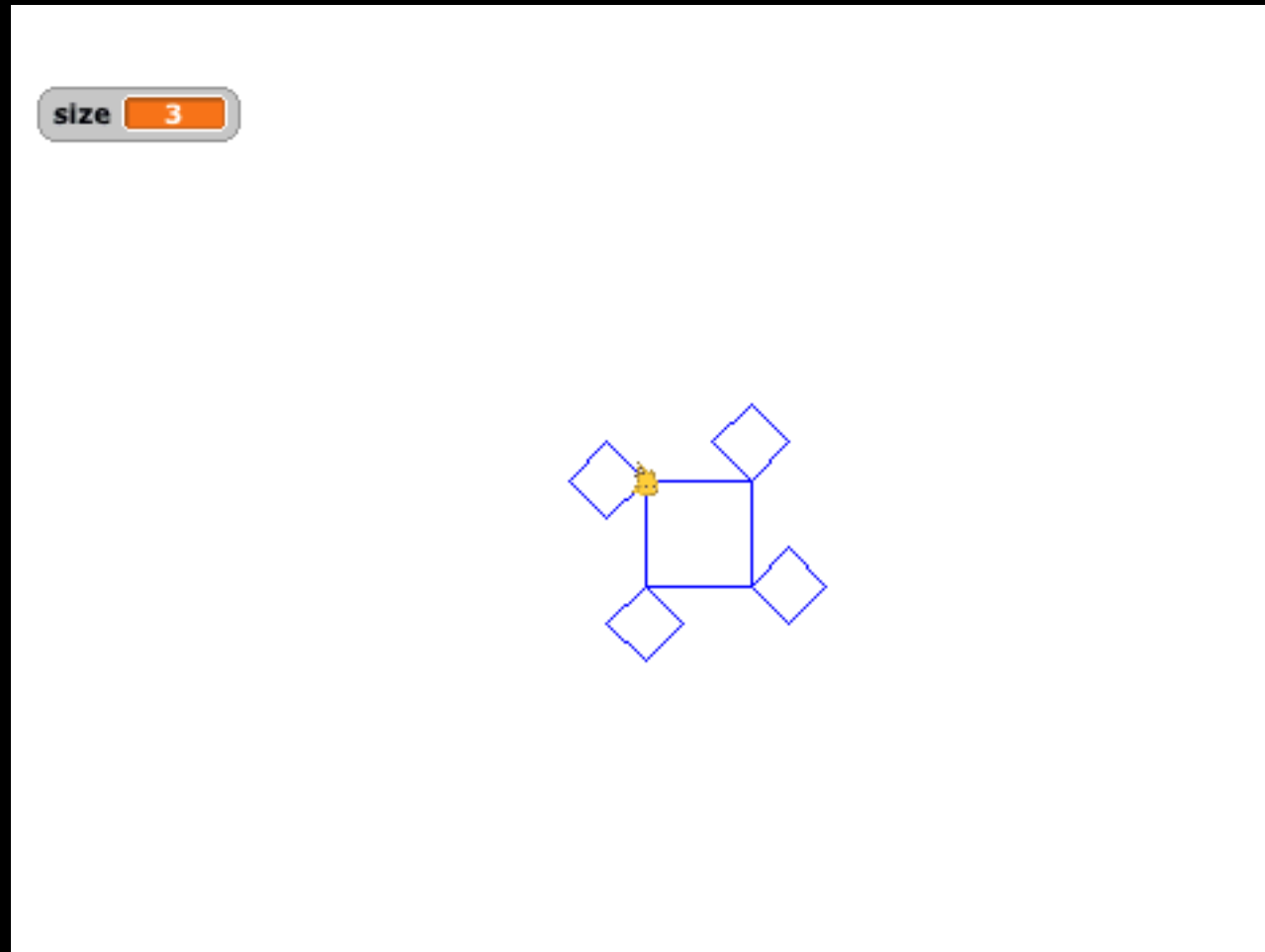
In this family each generation has one fewer child than the generation before it. For example, let's say Margo had five children. Each of Margo's children would have four, and each of those children would have three.

How large is your family tree, given that you're a relative of Margo and a member of the zero-child generation?

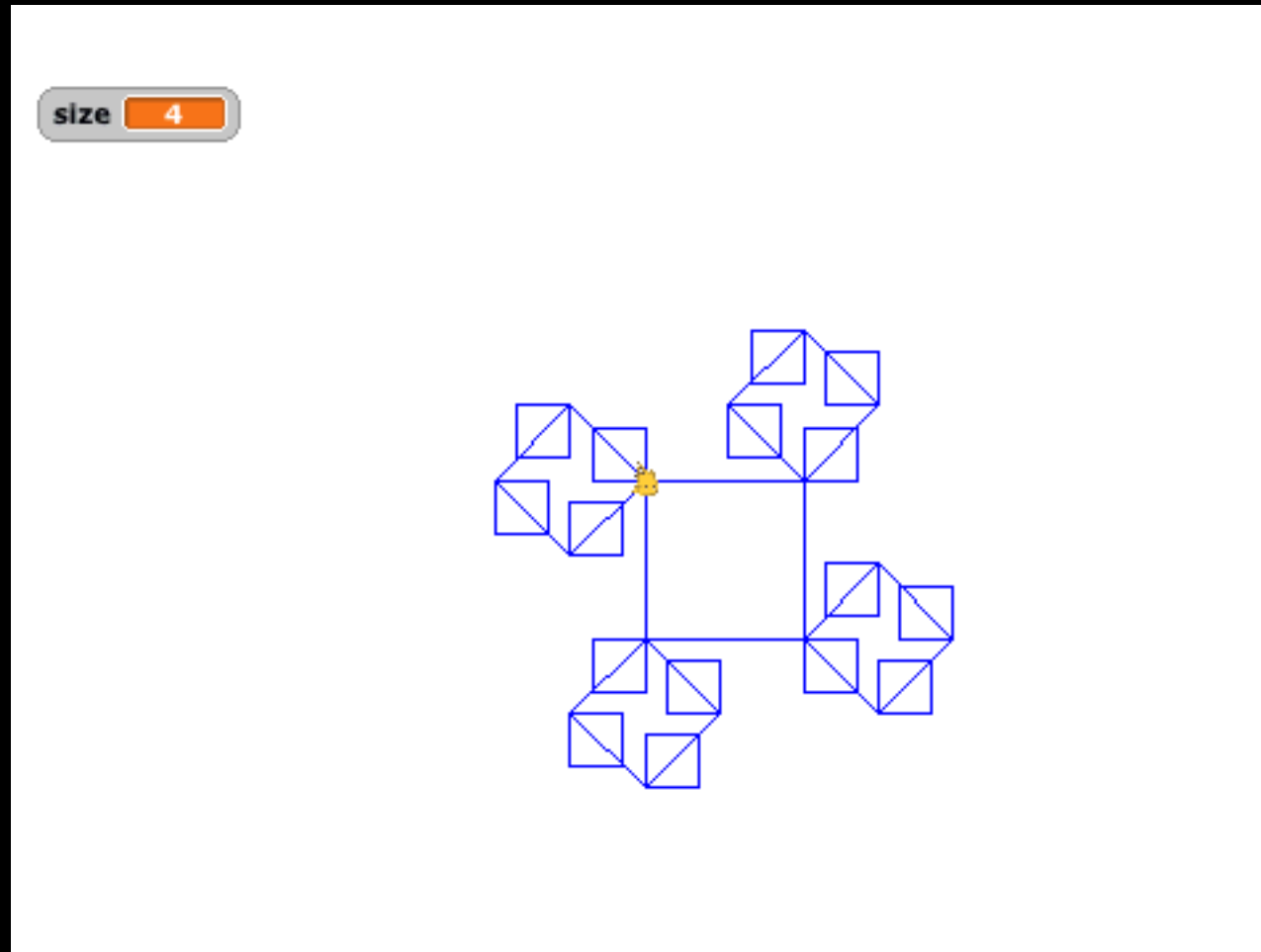
# Practice Problem #8 (fractal, step 2)



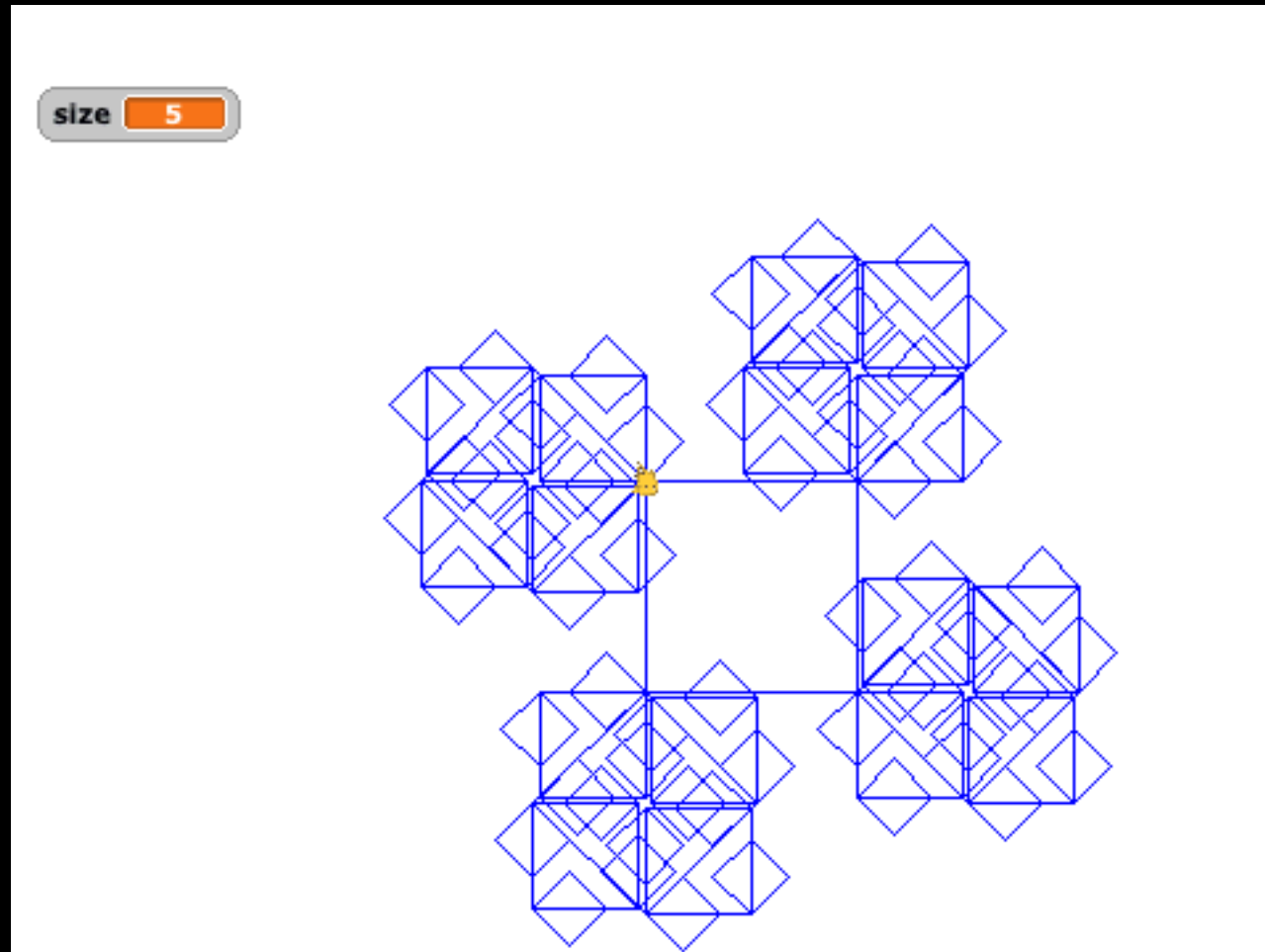
# Practice Problem #8 (fractal, step 3)



# Practice Problem #8 (fractal, step 4)



# Practice Problem #8 (fractal, step 5)

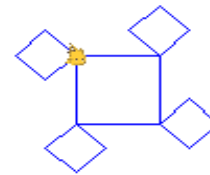


# Practice Problem #8 (fractal, all)

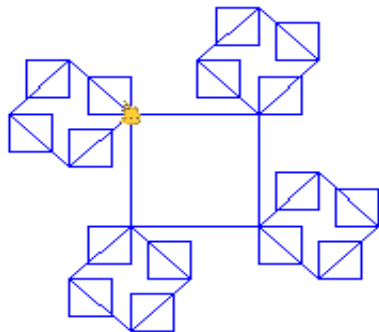
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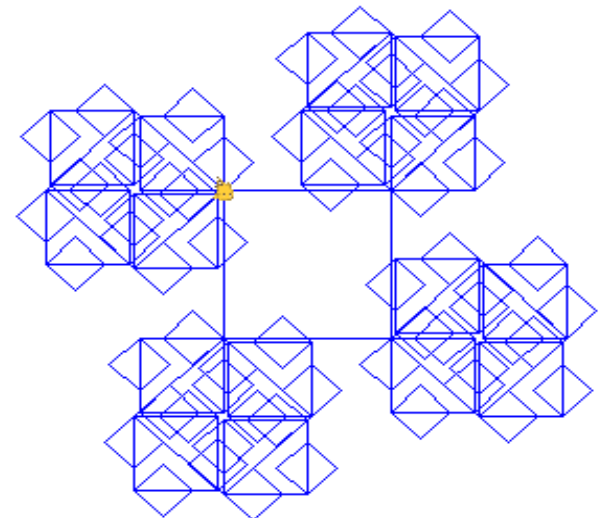
size 3



size 4



size 5



# Algorithmic Complexity: Which line is which?

