CompSci 94
Chap 6 Sec 1
September 24, 2013

Prof. Susan Rodger

Announcements

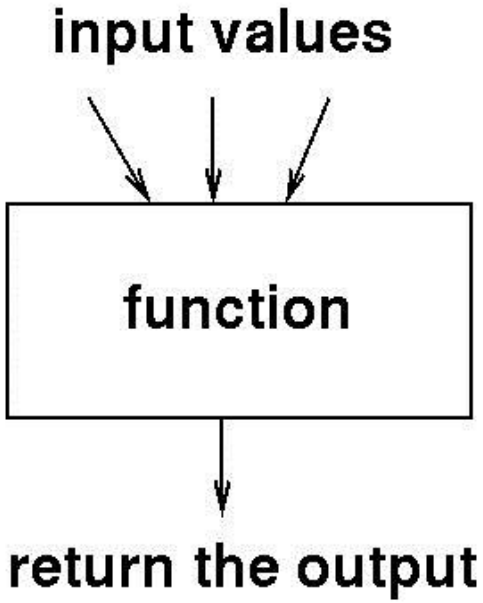
- Exam 1 Thursday, Oct 3
  - Closed book, closed notes, closed neighbor
  - Chaps 1-2, Chaps 4, 6, html
  - On Thursday, will give you an old exam to work on, then review it next Tuesday
- Assignment 4 storyboard due today
  - Alice world due Thursday

What we will do today

- Lecture on Chap 6, Sec 1 - Functions
- Classwork

Functionality

- A function
  - Receives value(s)
  - Performs computation on value(s)
  - Returns (sends back) a value
  - "return value" – means "value" is the answer, you leave the function (don't execute any more code in the function) and return the output
  - You should use the output value



Types of functions

- The type of a function depends on the type of value it returns
  - a calculated value (a number)
  - a specific object
  - a color
  - etc.

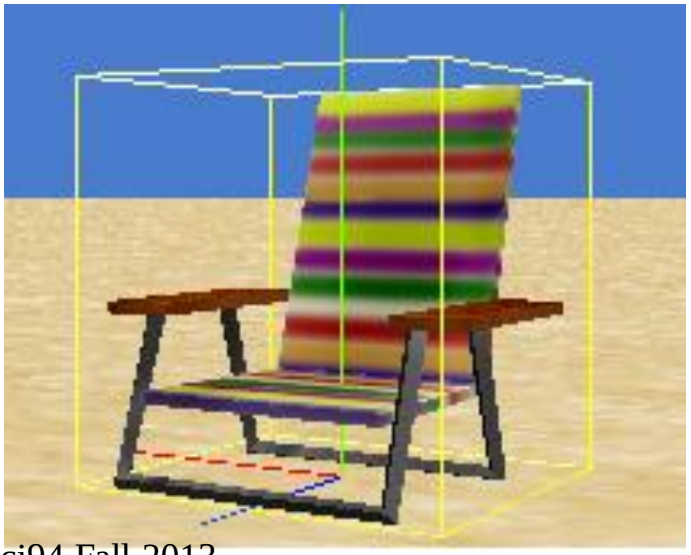
Built-in functions

- Last time used one of Alice's built-in functions
  - *skateAround* method for the *cleverSkater* uses the *distance to* built-in function

- Let's look at other examples.

Example of a function

- Write a function to calculate the perimeter of the bounding box of the function.
- I want to walk all the way around the chair, how far is that?



- Know width and depth of chair

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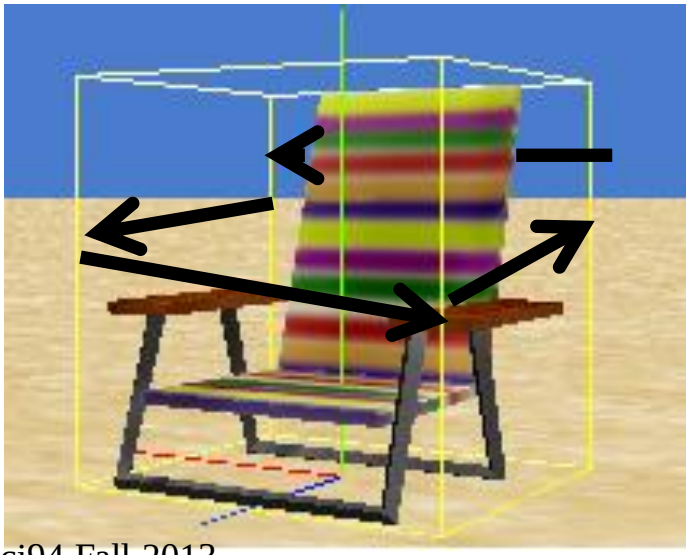


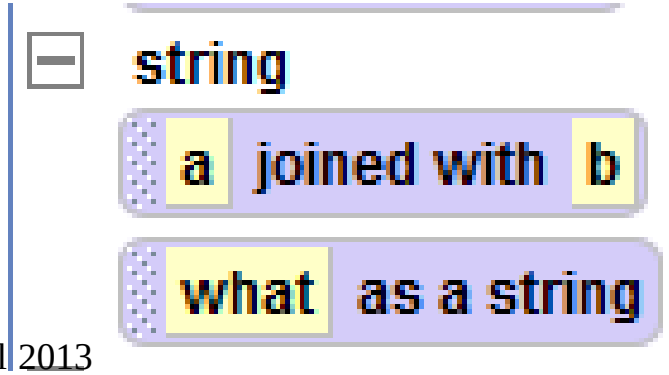
How do we write this function?

- Name of function?
- Parameters and types?
- What type is returned?

- How do we call/use this function?
- Is this a class function or world function?
  - Would we use this function with other objects?

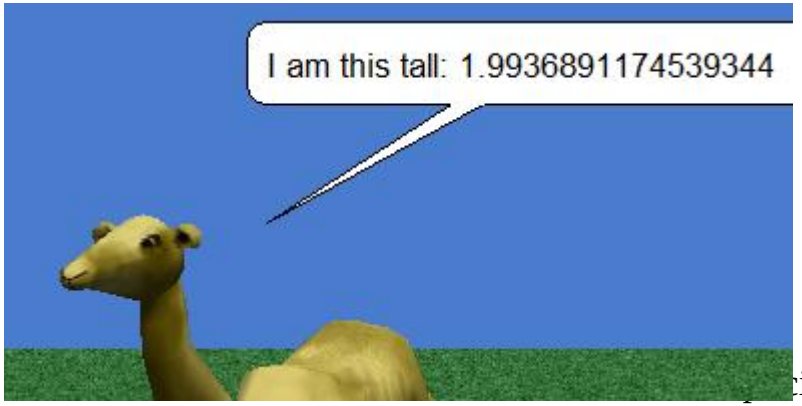
Built-in String functions

- String functions are under “world”, “functions tab”
  - “a joined with b” - join two strings together into a longer string
  - “what as a string” – converts a number into a string (6 into “6”)



Exercise: Write a function called phraseHowTall

- Given an object, this function should return a string "I am this tall: *num*" where *num* is the actual height of the object
- Then have objects say the result of calling this function

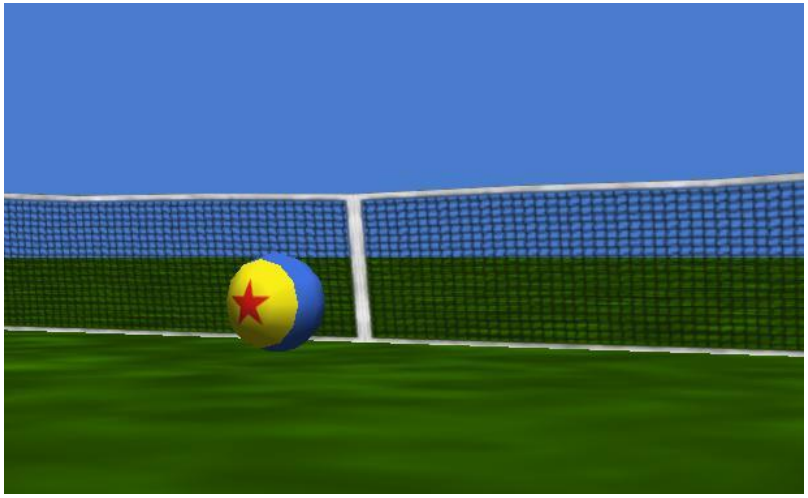


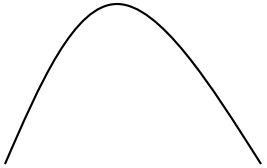
phraseHowTall

- Return value? Parameters and types?

Longer Story Example

- Move ball to within 1 meter of net, then bounce ball over the net.
  - Bounce - Ball should move up and forward, then down and forward



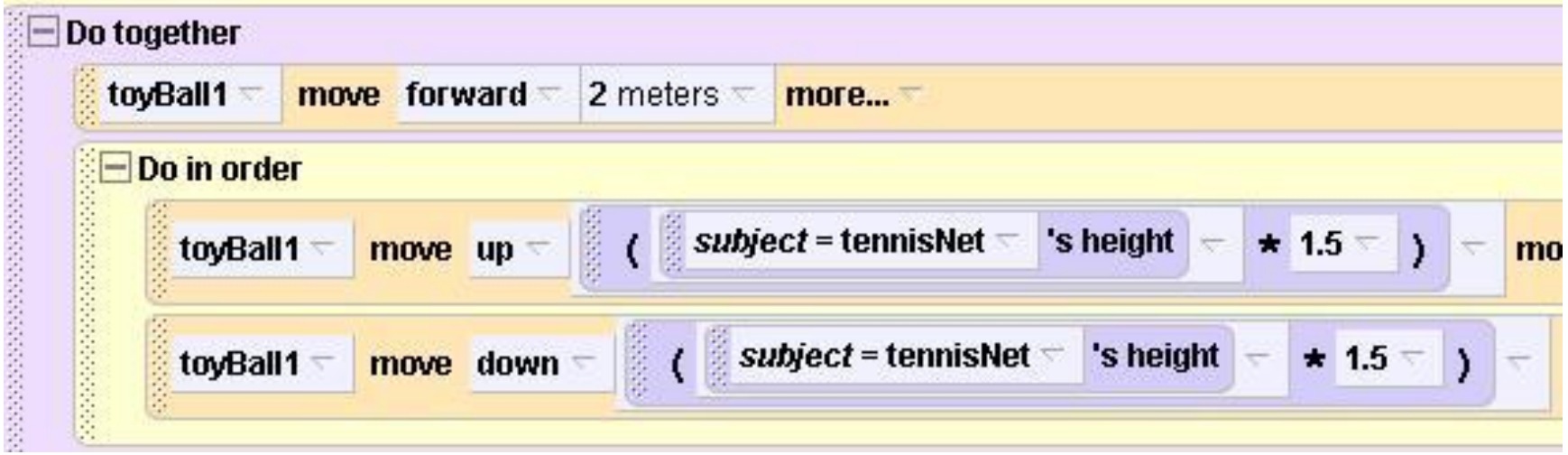


Move Ball to 1 meter from Net

- Use “distance to” function and math

Height

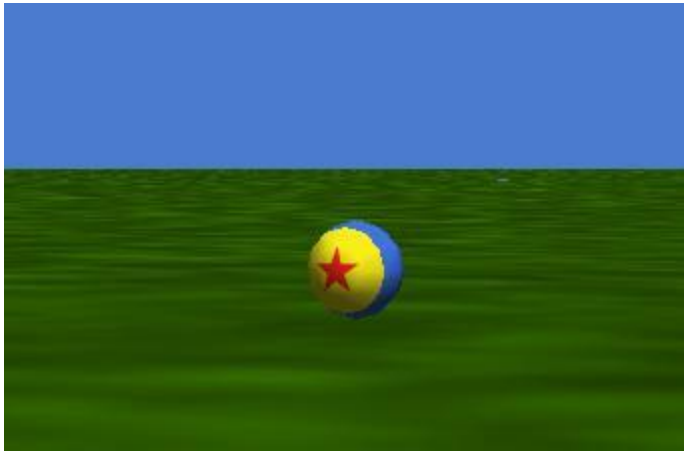
- Can use the built-in height function to determine the height of the net and move the ball up that distance



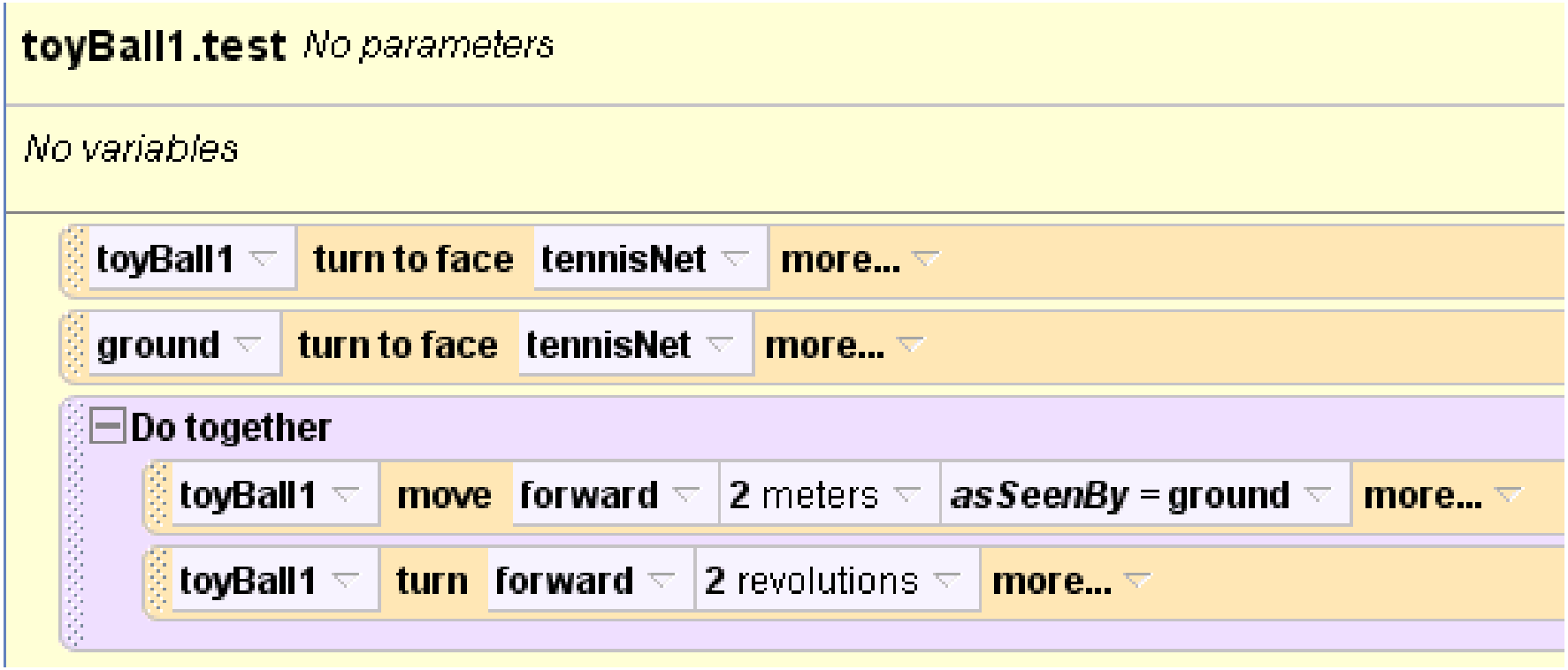
Demo – what happens?

Rolling the ball

- How do we roll the ball along the ground?
- Want a realistic motion rather than a slide
- The ball must simultaneously move and roll.
- The ball must roll “as seen by” ground
- The ball and ground must face the same direction



Demo: A first attempt



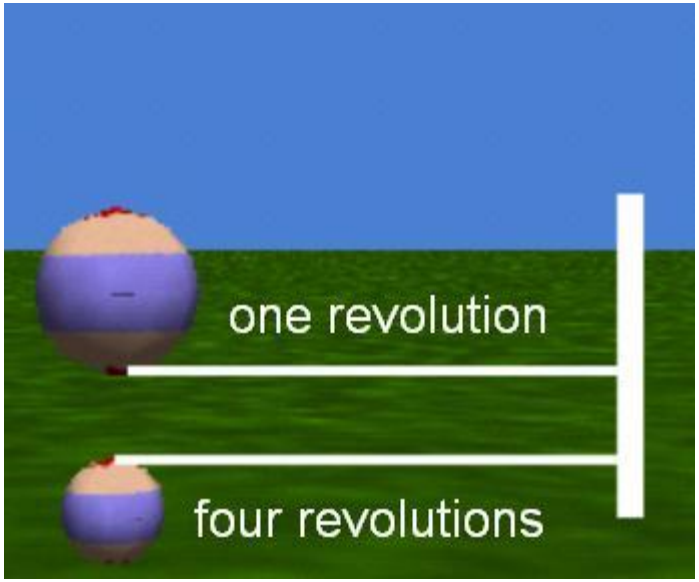
Revising the Approach

- The ball is made to roll 1 revolution.
- What if we want the ball to roll a certain distance?
- How can we make the ball roll the correct number of revolutions to cover a given distance along the ground?

Number of Revolutions

- The number of revolutions depends on the size of the ball
  - The number of revolutions is

    distance / (Pi * diameter)



- There is no built-in function to return the number of revolutions
  - Must write it!

Parameters

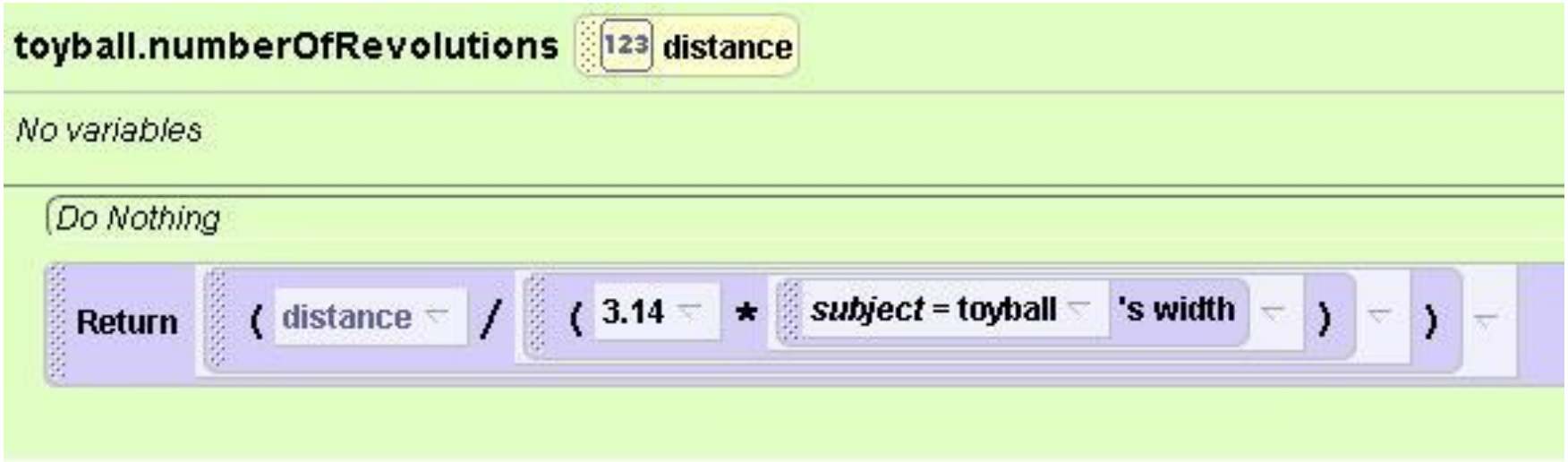
- We want to return the value computed as

  Distance / Pi * diameter

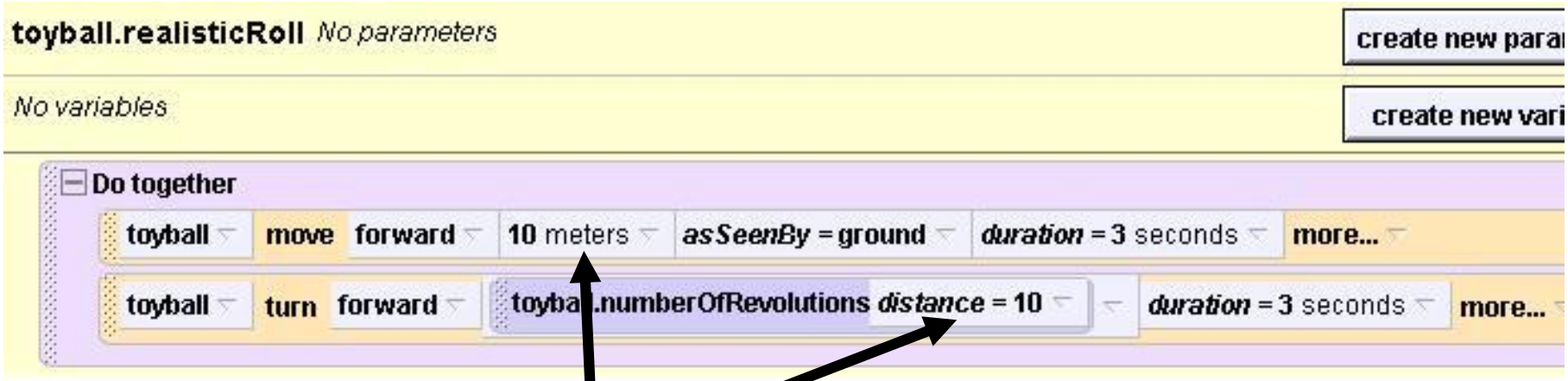
  where Pi = 3.14…

- Obviously, what is needed
  - The ball's diameter
    - The ball object has a built-in width function
  - The distance the ball is to travel
    - Can be sent as a parameter to the function

numberOfRevolutions function



Demo: Write method realisticRoll to Call the function



This is a test value

- Run the animation with several test values
- Make sure it works as expected
- What happens if you use a negative value?
- Add a parameter for distance

Now Ball roll to net?

- Difficult….
- ToyBall turn to face TennisNet and roll, what happens?

Tricky – Orient To

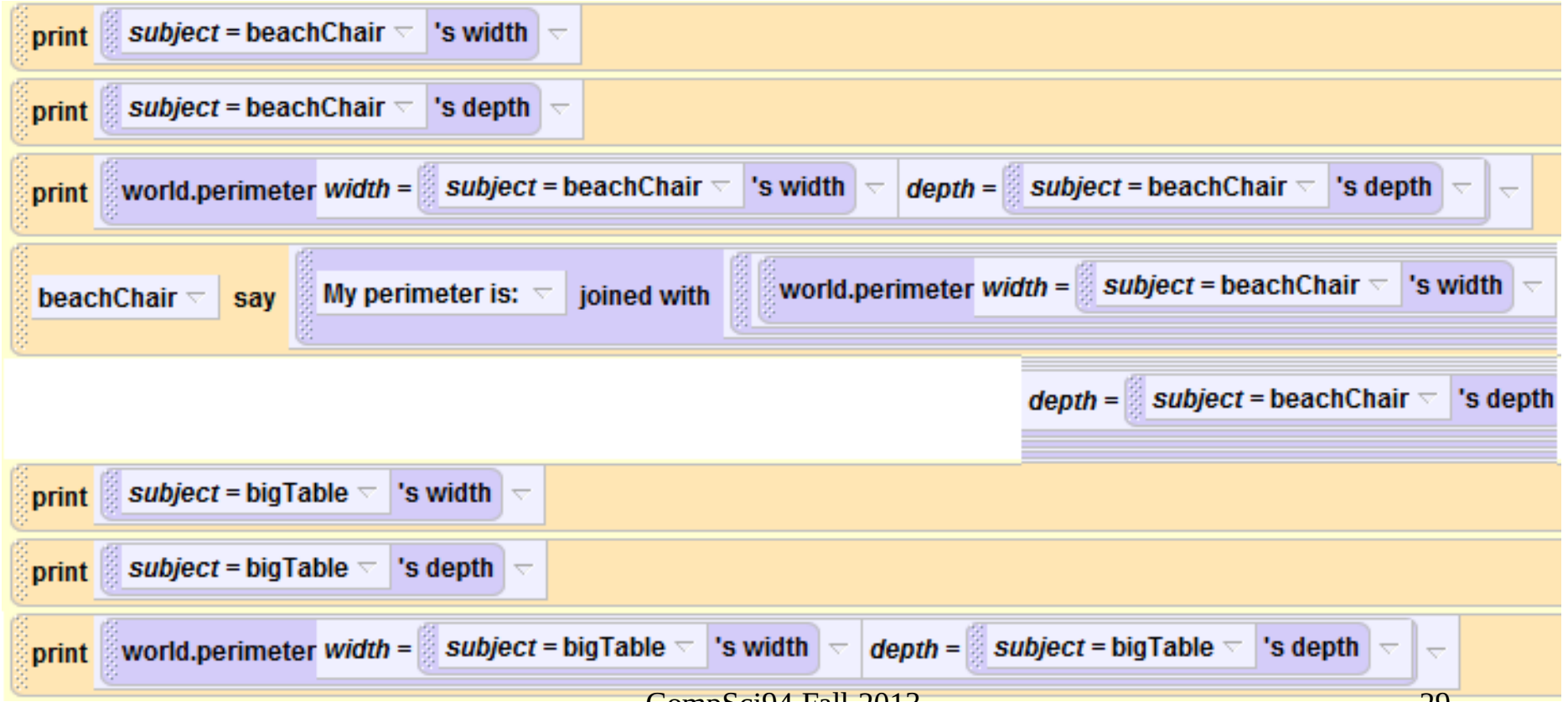
Levels of functions

- As with methods, you can write functions as either class-level or world-level. (what was the function we just wrote?)
- Guidelines for class-level methods apply to class-level functions:
  - No references to other objects
  - No references to world-level functions
  - Built-in world-level functions are ok

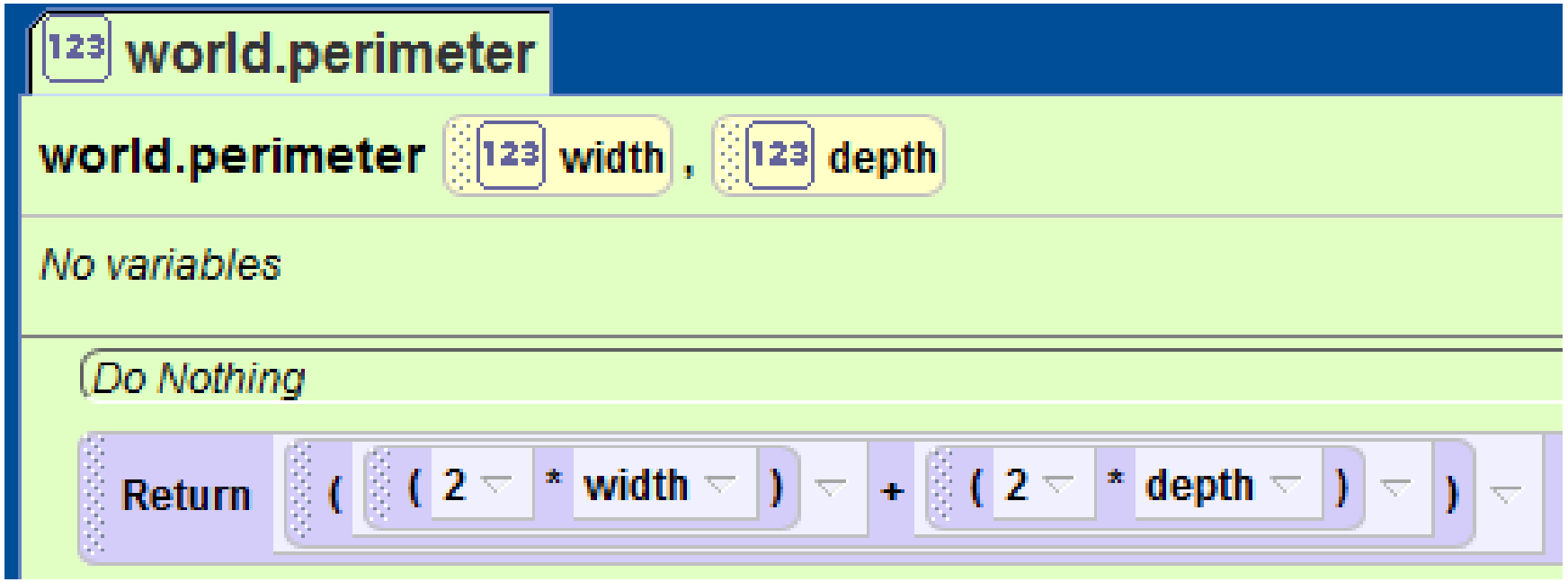
Classwork today

Calling Perimeter Function

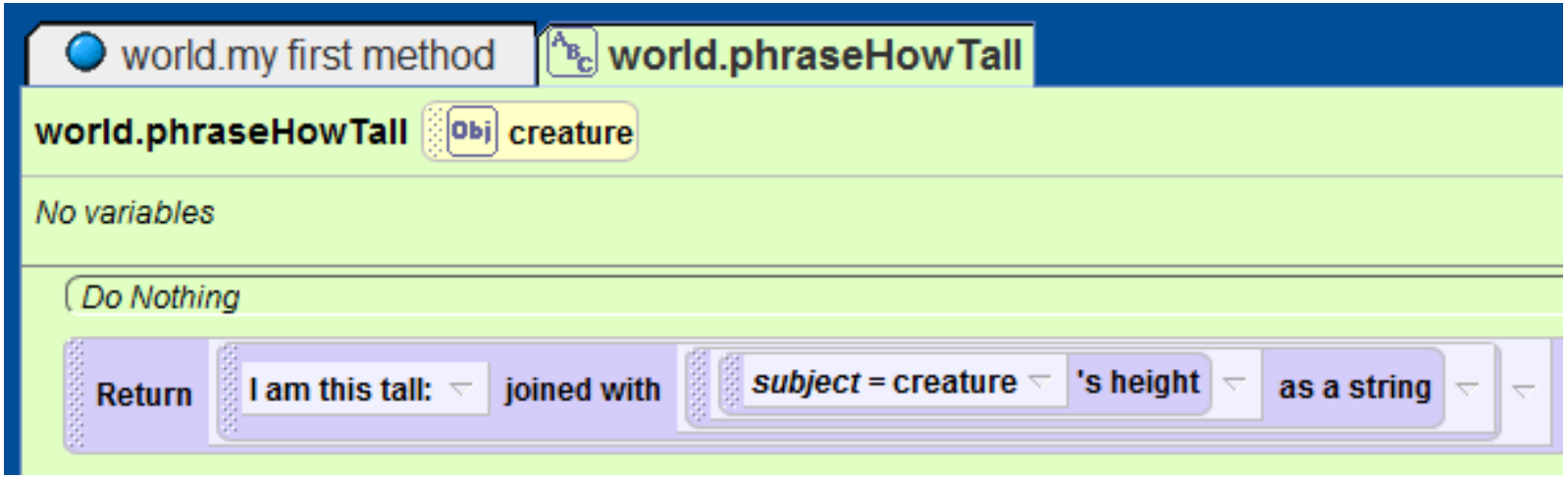
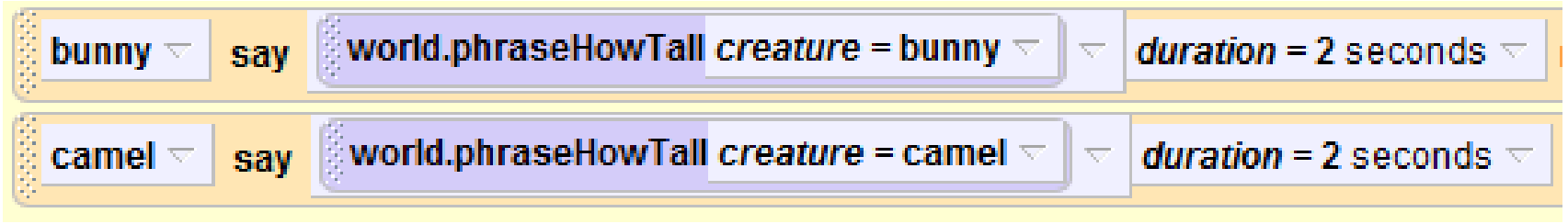
- Code in myFirstMethod



Perimeter Function



phraseHowTallFunction



Calling the function: