CompSci 4
Chap 6 Sec 1
September 22, 2009

Announcements

• Exam 1 Thursday, Oct 1
  – 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 Thursday
  – Alice world due Thursday too

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

input values

function

return the output
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

- Used one of Alice’s built-in functions
  - `skateAround` method for the `cleverSkater`

  ```plaintext
  cleverSkater → move forward → { cleverSkater → distance to nearObject → 1 } →
  ```

- Let’s look at another example.

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

  ```plaintext
  toyBall1 → turn to face tennisNet → move forward → { toyBall1 → distance to tennisNet → 1 } →
  ```
Height

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

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 – WHAT HAPPENS?

DEMO: A FIRST ATTEMPT

- 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 \( \frac{\text{distance}}{\pi \times \text{diameter}} \)

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

Parameters

- We want to return the value computed as \( \frac{\text{Distance}}{\pi \times \text{diameter}} \) where \( \pi = 3.14 \ldots \)

- 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
```

```
toyball.numberOfRevolutions (distance)
```

Demo: Calling the function

- 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?

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