CompSci 4
Chap 6 Sec 1
February 5, 2009

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Announcements

• Midterm exam Tuesday, Feb 17
  – Closed book, closed notes, closed neighbor
  – Chaps 1-2, Chaps 4, 6, html
  – On Tuesday, will give you an old exam to work on, then review it next Thursday
• Assignment 4 storyboard due Tuesday
  – Alice world due Tuesday 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`

- 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
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

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

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

Parameters

- We want to return the value computed as 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

Demo: Calling 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

\( \text{numberOfRevolutions} \) function

\begin{verbatim}
toyball.numberOfRevolutions distance
\end{verbatim}
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

Tricky – Orient To

Classwork today