Announcements

- Read Chapter 7, Sec 1 for next time – Reading Quiz
- Don't use copy to copy an object!
  - We will learn why later
  - Instead, import the object twice from the class folder
- Lecture on Chap 6, Tips and Techniques
  - Random numbers and random motion
  - We will also learn about variables

Random Numbers

- Random numbers are used in certain kinds of computer programs
- Examples
  - Security for web applications
  - Encryption for satellite transmissions
  - Gaming programs
- We will look at examples of using random numbers in animations

Built-in functions

- Alice provides built-in functions for generating random numbers
Example

• Move chicken forward a random amount

• The random number function returns a fractional value between 0 and 1

Demo: A range of values

• Can specify a different range of values by specifying a minimum and maximum value

• In this example, the random number will be a fractional value between 1 and 5

Demo: Integers (whole numbers)

• To generate a random integer value
  – Select integerOnly from the more option and make it true

  – Random value selected from 1, 2, 3, or 4 - not 5!

Random Hopping

• Rabbit hops (moves up) a random amount
• Rabbit comes back down to the ground, the same random amount

• What happens? How do we fix it?
Local Variable - in a method

- A local variable in a method
  - Stores a value
  - Has an initial value
  - Its value can be changed (set)
  - Its value can be used only in one instance of this method

- To create a local variable in a method
  - Click on create variable
  - Give an initial value

- To use a variable’s value
  - Drag the variable into place

Example – create a local variable

- distance – will store distance bunny is to move up

Setting a Variable’s value

- Drag variable down and select value

Use Variable’s value - Demo

- Drag and drop distance into places where you want to use its value
Set Variable to Random Value - Demo

• Distance is set a random value
• Same value is then used to move up and down

• Use print to print out the value of the variable

Class Variables

• Use “create new variable” under properties to create a class variable for an object
• This “class variable” will maintain the value throughout the running of the world unless you reset it

Random Motion

• In some animations, we want an object to move to a random location. We call this random motion.
• For example, a goldfish swimming in a random motion.

Six Possible Directions

• Six move directions are possible
  – Forward, backward, left, right, up, down
• We will eliminate backward, fish do not swim backward
• To simplify code, take advantage of negative numbers
  – This instruction moves the goldfish right
Storyboard

- Only three move instructions needed
  - Up (move down if negative)
  - Left (move right if negative)
  - Forward (no backward motion)

- Two parameters (min, max) to restrict motion of fish to nearby location

```
fish.randomMotion
Parameters: min, max
Do together
  fish move up (or down) random distance
  fish move left (or right) random distance
  fish move forward random amount
```

randomMotion

- Minimum distance for move forward is 0

Demo

- To call randomMotion method, specify min and max values

```
goldfish.randomMotion min = 0.2 max = 0.2
```

Demo

- Repeating the random fish motion over and over again…. (more on this next chapter)

- Change world.my first method

```
Loop 100 times times show complicated version
```

```
goldfish.randomMotion min = 0.2 max = 0.2
```
Classwork today

- Event handlers
- Random values
- Variables

- NO LOOPS