Note: thanks to Wanda Dann and Steve Cooper for slide ideas
Announcements

• Read Chapter 9.1 for next time
• Assignment 6 due Nov 8
  – Finish classwork from Thursday first…
What we will do today

• Lecture on Chap 7 Sec 2 and Tips and Tech.
  – While loop – indefinite loop
  – Event Loops

• Classwork
Last time - Loop – definite number

- What is the output?
Repetition

• Sometimes don’t know exactly how many times a set of instructions are repeated.
• Stopping is based on a condition
• Example:
  – Game of Chess, how many moves until win
  – Stop: when markers are in check mate position
Indefinite Repetition

• In programs where number of repetitions not known in advance, can use
  – While statement (today)
  – Recursion (Chap 8) - later
• While some condition is true
  – execute instructions
Example

• Common feature in popular “action films” is a chase scene

• Example: hungry shark chasing fleeing goldfish
  – Repeat: fish swim away from shark, and shark swim toward fish
  – Shark swim distance a little more than fish swim distance
  – Eventually, shark will catch up with fish and eat fish
## Storyboard

<table>
<thead>
<tr>
<th>Event</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>World.chase</td>
<td></td>
</tr>
<tr>
<td>While goldfish more</td>
<td>goldfish.flee (away from shark)</td>
</tr>
<tr>
<td>than .5 meters from</td>
<td></td>
</tr>
<tr>
<td>shark</td>
<td></td>
</tr>
<tr>
<td>Do in order</td>
<td></td>
</tr>
<tr>
<td>shark point at</td>
<td></td>
</tr>
<tr>
<td>goldfish</td>
<td></td>
</tr>
<tr>
<td>Do together</td>
<td></td>
</tr>
<tr>
<td>shark swim</td>
<td></td>
</tr>
<tr>
<td>(toward goldfish)</td>
<td></td>
</tr>
<tr>
<td>goldfish</td>
<td></td>
</tr>
<tr>
<td>flee</td>
<td></td>
</tr>
<tr>
<td>(away from shark)</td>
<td></td>
</tr>
<tr>
<td>shark eat</td>
<td></td>
</tr>
<tr>
<td>goldfish</td>
<td></td>
</tr>
</tbody>
</table>

shark.Swim, shark.eat and goldfish.flee in book
World.chase

World.chase  No parameters

No variables

- While
  - goldfish distance in front of shark more... > 0.5

- Do in order
  - shark point at goldfish duration = 0 seconds style = abruptly more...

- Do together
  - shark.swim
  - goldfish.flee

- shark.eat what = goldfish
Shark will catch goldfish

• How do you know the shark will eventually catch the goldfish?
  – Shark always moves 0.4 meters towards goldfish
  – Goldfish moves randomly away from shark at most 0.2 meters
  – Shark will eventually catch up, the loop will end
General “Rule of Thumb”

- As a general rule, a While loop should be written so the loop will eventually end
  - Requires statements inside the loop change the conditions of the world such that condition for While eventually becomes false
- If While loop never ends
  - Infinite while loop
Practice – From Bunny eats Broccoli

- Replace with while loop, bunny hops until close to closestBroc (< 1 meter)
Practice – Eat Broccoli until all invisible

Assume method 
bunny.hopToClosestBroccoliAndEatIt exists
ReWrite with while loop

- Eat broccoli (broc1, broc2, and broc3) until gone (all invisible)
- Assume at least one of the brocs is visible when start
Classwork – Can Cinderella and Handsome Prince ever get together?

• Objects
  – Cinderella, HandsomePrince, ball

• Setup
  – Cinderella and Prince 10 units each from middle

• Game
  – both Cinderella and Handsome prince move forward randomly
  – If both reach the middle, they connect!
  – If either reach the middle alone, then that one starts over
Setup

- They start by touching hands.
  - ballCinderella (invisible) is at same location as Cinderella
  - ballPrince (invisible) is at same location as Prince
- They both turn and walk 10 units
- They turn and face.
Play
Repeat forever

• They both move randomly forward
• Cinderella gets to the middle first alone.
  – She turns around
  – Goes forward 10 units
  – She turns back around
• They are both in middle at same time
  – Message displayed and stop
World. My first method

Note: variable, where is it set and used?
What is repeated a lot?

- Turn around
- Move forward 10 units
- Turn back around
// Move Cinderella and prince to starting positions at the same time

// They should move one unit at a time

- Do together
  - world.turnAround personToTurn = handsomePrince unit = unit
  - world.turnAround personToTurn = cinderella unit = unit
turnAround
• Turn halfway around
• Move forward 10 units, 1 unit at a time
• Turn back around
randomInt

world.randomInt No parameters

123 ranInt = 1

// returns integer from 1 to 3

ranInt set value to random number minimum = 1 maximum = 3.99 more...

ranInt set value to floor ranInt

Return ranInt
How to move forward randomly?

- Move forward randomly 1 to 3 units, but not past marker ball?
- Use randomInt
More Detailed Play

• Repeat over and over
  – Cinderella moves forward 1 to 3 units, but not past the ball.Cinderella, her spot in the middle
  – Prince moves forward 1 to 3 units, but not past the ball.Prince, his spot in the middle
  – If both are in the middle, display a message, then stop.
  – If just one in the middle, then that one starts over
// repeatedly try to connect Cinderella and Handsome prince, they move randomly
// They connect only if they are in the middle at the same time