Quick Announcements

Sign up for sections **by today at 5pm.**

Don’t forget to fill out the form to tell us about yourself! It’s on Piazza, the lecture slides, and the CS106a website.
Plan for Today

- Karel’s (Code) World
- Review: Our First Method!
- For Loops and Fence Posts
- While Loops
- If Statements

hi class!
importStanford.karel.*;

publicclassCollectNewspaperKarelextendsSuperKarel{

    publicvoidrun(){

        // Your main program here!

    }

    // Create new methods for Karel down here!

}
import stanford.karel.*;

public class CollectNewspaperKarel extends SuperKarel {

    public void run(){

        // Your main program here!

    }

    // Create new methods for Karel down here!

}
import stanford.karel.*;

public class CollectNewspaperKarel extends SuperKarel {
    public void run()
    {
        // Your main program here!
    }
    // Create new methods for Karel down here!
}

Name of Program
import stanford.karel.*;

public class CollectNewspaperKarel extends SuperKarel {

    public void run() {
        // Your main program here!
    }

    // Create new methods for Karel down here!
}

This is the Type of Program We’re Creating
import stanford.karel.*;

public class CollectNewspaperKarel extends SuperKarel {
    public void run() {
        // Your main program here!
    }

    // Create new methods for Karel down here!
}

“run” Method - All of Our Programs Will Have This!
import stanford.karel.*;

public class CollectNewspaperKarel extends SuperKarel {

    public void run(){
        // Your main program here!
    }

    // Create new methods for Karel down here!
}

Brackets Noting the Beginning and End of a Code Block
A method is a set of new instructions we've created!

```java
/* Comment describing method */
private void nameOfMethod(){
    // command 1
    // command 2
}
```
A method is a set of new instructions we've created!

```java
/* Allows Karel to turn right */
private void turnRight()
{
    turnLeft();
    turnLeft();
    turnLeft();
}
```
Do It Again, Karel!

Karel recently got a job tiling floors. Can we help Karel fill this WHOLE world with tiles (aka beepers)?
Karel Can:

move();

turnLeft();

putBeeper();

pickBeeper();

And now: turnRight();

What’s The Plan?

What’s the Plan?

Pseudocode or “fake code” is a common term used to describe a programming plan.
What’s The Pseudocode?
place a beeper
move
place a beeper
move
place a beeper
move
place a beeper
What’s The Pseudocode?

place a beeper
move
place a beeper
move
place a beeper
move
place a beeper

Seems repetitive…
How can we simplify it?
What's The Pseudocode?

repeat three times:

place a beeper
move
place a beeper

Much better!
Wait! How Do We Repeat?

Ummmm, what do you mean by repeat? What does that code look like?
For loops repeat something a specific number of times!

```java
for (int i = 0; i < num_times; i++) {
    // command 1 to repeat!
    // command 2 to repeat!
}

// code out here is NOT repeated!
```
Our pseudocode:

repeat three times:
   place a beeper
   move
place a beeper
For Loops

Our pseudocode:

repeat three times:
place a beeper
move
place a beeper

Our Code!

```java
for(int i = 0; i < 3; i++){
}
```
For Loops

Our pseudocode:

repeat three times:
  place a beeper
  move
  place a beeper

Our Code!

```java
for(int i = 0; i < 3; i++){
    putBeeper();
    move();
}
putBeeper();
```
The Fencepost Pattern

Notice:

We put a beeper 4 times. We moved 3 times.

Our Code!

```
for(int i = 0; i < 3; i++){
    putBeeper();
    move();
}
putBeeper();
```
The Fencepost Pattern

Notice:

We put a beeper 4 times.
We moved 3 times.
Notice:

We put a beeper $n+1$ times. We moved $n$ times.
What If...

Our pseudocode:
repeat three times:
    place a beeper
    move
    place a beeper

What if we don't know how many tiles Karel will have to lay down?

Our Code:
for(int i = 0; i < 3; i++){
    putBeeper();
    move();
    putBeeper();
}
While Loops repeat until a condition is no longer met!

```java
while(conditionIsTrue()){
    // command 1 to repeat!
    // command 2 to repeat!
}

// the condition isn’t true anymore,
// so our code exited the while loop.
// code out here is NOT repeated!
```
What Does Karel Know?

What conditions can I check? Can I check if anything is true?
<table>
<thead>
<tr>
<th>Test</th>
<th>Opposite</th>
<th>What it checks</th>
</tr>
</thead>
<tbody>
<tr>
<td>frontIsClear()</td>
<td>frontIsBlocked()</td>
<td>Is there a wall in front of Karel?</td>
</tr>
<tr>
<td>leftIsClear()</td>
<td>leftIsBlocked()</td>
<td>Is there a wall to Karel's left?</td>
</tr>
<tr>
<td>rightIsClear()</td>
<td>rightIsBlocked()</td>
<td>Is there a wall to Karel's right?</td>
</tr>
<tr>
<td>beepersPresent()</td>
<td>noBeepersPresent()</td>
<td>Are there beepers on this corner?</td>
</tr>
<tr>
<td>beepersInBag()</td>
<td>noBeepersInBag()</td>
<td>Any there beepers in Karel's bag?</td>
</tr>
<tr>
<td>facingNorth()</td>
<td>notFacingNorth()</td>
<td>Is Karel facing north?</td>
</tr>
<tr>
<td>facingEast()</td>
<td>notFacingEast()</td>
<td>Is Karel facing east?</td>
</tr>
<tr>
<td>facingSouth()</td>
<td>notFacingSouth()</td>
<td>Is Karel facing south?</td>
</tr>
<tr>
<td>facingWest()</td>
<td>notFacingWest()</td>
<td>Is Karel facing west?</td>
</tr>
</tbody>
</table>
Tiling the Floor with While Loops

What’s the Pseudocode?
What's the Pseudocode?

while nothing is in front of Karel:
    place a beeper
    move
Our pseudocode:

while nothing is in front of Karel:
  place a beeper
  move
Tiling the Floor with While Loops

Our pseudocode:

while nothing is in front of Karel:
    place a beeper
    move

Our Code!

```java
while(frontIsClear()){
}
```
Tiling the Floor with While Loops

Our pseudocode:
while nothing is in front of Karel:
  place a beeper
  move

Our Code!
```java
while(frontIsClear()){
    putBeeper();
    move();
}
```
Let’s Code It!
Don’t Forget to Test!

Remember to test early and test often.

Test parts of your program as you go along to catch bugs along the way!
What Are We Missing?

What's the Pseudocode?

while nothing is in front of Karel:
  place a beeper
  move
What's the Pseudocode?

while nothing is in front of Karel:
    place a beeper
    move

place a beeper
Tiling the Floor with While Loops

Our pseudocode:
while nothing is in front of Karel:
    place a beeper
    move
    place a beeper

Our Code:
```plaintext
while(frontIsClear()){
    putBeeper();
    move();
}
putBeeper();
```
Let’s Code It!
Tiling the Floor with While Loops

Our pseudocode:

while nothing is in front of Karel:
  place a beeper
  move
  place a beeper

Looks like another fencepost program!

Our Code!

```java
while (frontIsClear()){
    putBeeper();
    move();
}
```
How do I know when I should use a while loop or a for loop?
While Loop or For Loop?

- **For Loop**: Know how many times
- **While Loop**: Don't know how many times
- **Process to Repeat**
All of this repeating is making me tired!
What if I only want to check for something only once?
If statements check a condition once!

```java
if(conditionIsTrue()){
    // command 1!
    // command 2!
}
```

// we have left the if statement.
// code out here happens no matter what!

Phew, that looks much better...
Karel, Let’s Pick Up These Old Tiles!

Karel must pick up all of the old tiles that were left behind!
Tile Clean Up Example

Before:

After:
Karel, Let’s Clean Up!

What’s the Pseudocode?
Karel, Let’s Clean Up!

What's the Pseudocode?

while nothing is in front of Karel:
  pick up beeper
  move
Karel, Let’s Clean Up!

What’s the Pseudocode?

while nothing is in front of Karel:
  pick up beeper
  move
  pick up beeper
Cleaning Up

Our pseudocode:

while nothing is in front of Karel:
  pick up beeper
  move
pick up beeper
Cleaning Up

Our pseudocode:

while nothing is in front of Karel:
  pick up beeper
  move
pick up beeper

Our Code!

```
while(frontIsClear()){
    pickBeeper();
    move();
}
pickBeeper();
```
Let’s Code It!
Our pseudocode:
while nothing is in front of Karel:
  pick up beeper
  move
pick up beeper

Our Code!

while(frontIsClear()){
  pickBeeper();
  move();
}
pickBeeper();

You can't pick up a beeper if there isn't one there!
UH OH!

What's the Pseudocode?

while nothing is in front of Karel:
  pick up beeper
  move
  pick up beeper

Maybe we should add an if statement to check for a beeper!
Cleaning Up with If Statements

What's the Pseudocode?

While nothing is in front of Karel:
  If there is a beeper:
    Pick up beeper
    Move

If there is a beeper:
  Pick up beeper

That looks better.
Our pseudocode:

while nothing is in front of Karel:
   pick up beeper
   move
pick up beeper

Our Code:

```plaintext
while(frontIsClear()){
   pickBeeper();
   move();
}
pickBeeper();
```
Our pseudocode:

while nothing is in front of Karel:
  if there is a beeper:
    pick up beeper
  move

if there is a beeper:
  pick up beeper

Our Code!

```c
while(frontIsClear()){
    if(beepersPresent()){
        pickBeeper();
    } 
    move();
}
if(beepersPresent()){
    pickBeeper();
}
```
If statements check a condition once!

```java
if(conditionIsTrue()){
    // command 1!
    // command 2!
}
// we have left the if statement.
// code out here happens no matter what!
```

Phew, that looks much better...
One Last Thing: If-Else

The `else` code only runs if the condition is not true!

```java
if(conditionIsTrue()){
    // command 1 if conditionIsTrue()!
    // command 2 if conditionIsTrue()!
}
else {
    // command 1 if conditionIsFalse()!
    // command 2 if conditionIsFalse()!
}
// code out here happens no matter what!
```
Plan for Today

- Karel’s (Code) World
- Review: Our First Method!
- For Loops and Fence Posts
- While Loops
- If Statements

Homework:
- Set up Eclipse (instructions on course website)
- Due 5pm Today: Sign up for section on course website
- Assignment 0: Tell us about yourself - https://bit.ly/2X0Pmzz