CS 105

Lab #1: Introduction to Programming
January 22-24, 2014

In lecture this week, you learned that computer programming requires the development of an "algorithm" – a step-by-step procedure for the computer to run. There are hundreds of different "computer programming languages" that an algorithm can be programmed in, but most of these languages all have the same underlying structure. One such programming language is "Scratch".

Scratch is a visual, block-based programming language, allowing a programmer to develop a program using drag-and-drop blocks. Scratch is easy to use, a lot of fun, and all the concepts you are learning in Scratch directly translates to "JavaScript" (the mainstream language used on the Internet).

This week in lab you will write and submit your very first program! Don't worry: it will be very simple, this lab assignment will guide you through it, and you have both your TA and your peers if you get stuck.

Launching Scratch

Step #1: Open up a browser and navigate to the CS 105 website.
(URL: **http://bit.ly/cs105sp14**)

Step #2: Click "Labs / Office Hours / Contact" and click "Week #1: Introduction to Programming".

Step #3: Follow the link to the "Scratch Editor". Your browser should look similar to the image on the right (➔).
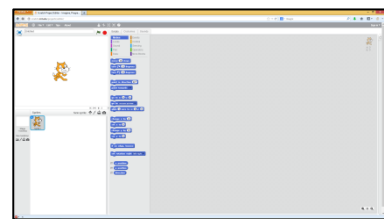
Your First Program

The simplest way to use Scratch is to simply start dragging and dropping blocks into the large gray area.

Step #4: Select the "Events" (Dark Orange) tab from the "Scripts".

Step #5: Drag `when ⚑ clicked` to the scripting area, as shown by the image to the right of this step (➔). This is a starter block, allowing other blocks to be connected to it from the bottom of the block.

Step #6: Select the "Motion" (Dark Blue) tab from "Scripts".

Step #7: Drag `move 10 steps` to the scripting area, connecting it to the `when ⚑ clicked` block. Your block should now have two components (as shown to the right ➔).
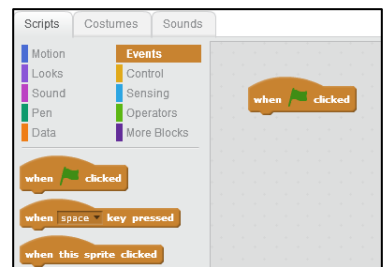
Step #8: Click ⚑, located to the left of the "Scripts" tab (above the white area with the cat). Each time you click this, the cat will move a small amount – exactly 10 steps, just as you specified!

Step #9: In the "Motion" (Dark Blue) tab, add `turn ↻ 15 degrees` to the end of your block chain.

Step #10: Click the (15) in "(15) degrees" and change it to 18.

Step #11: Run your program by clicking ⚑. Your cat should rotate in a complete circle if you click it a total of 20 times!

The lab continues on the reverse side of this sheet of paper.

Adding Logic

One task that computers are particularly good at is repeating the same thing multiple times. Instead of having you click 20 times, we will program the computer to do it for us!

Step #12: Click the "Control" (Yellow) tab and drag into an empty space on your scripting area.

Step #13: Change the (10) in "repeat (10)" to 20.

Step #14: Construct the program to move the cat 10 steps and turn 18 degrees a total of 20 times. The program should look like the block structure on the right (➔).

Conditional Logic

To make computers appear "intelligent", programmers use conditional statements where a program will run a different algorithm when a certain condition is true. For example, "**if** it's raining: give the cat an umbrella". We will add a conditional to our program!

Step #15: In the "Control" (Yellow) tab, add a block to slow the program down and a conditional block. Duplicate the program to the right (➔).

For this lab, our conditional will involve changing the cat's color if the mouse cursor is touching the cat. To do this, we need to fill in the "if-statement" with that conditional.

Step #16: In the "Sensing" (Light Blue) tab, drag to the bracket in the if-statement. Click the drop down and choose "mouse-pointer".

Step #17: In the "Looks" (Purple) tab, drag inside the if-statement. Your complete program should look like the image to the right (➔).

Step #18: Run your program! Your cat should slowly rotate in a circle. If your mouse cursor is over the cat, it should change colors every time it moves. You just completed your first program!
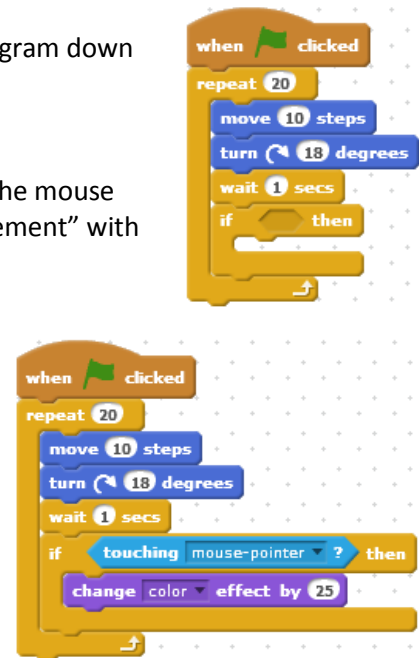
Step #19: *Save your work!* Inside Scratch, click "File" and then "Download to your Computer". Save this file on your desktop (or somewhere) – you will need to upload it to the CS 105 lab submission page.

Submitting the Lab

Instructions to submit your lab is on the "Lab #1" page of the CS 105 website (see Step #1 and #2). Remember, **every person in your group must submit the lab**. One member will randomly be chosen, and their program will be the grade for everyone. It is your job to make sure everyone who is in your group who is in lab has a complete program!