

## CS 312

### Lab #3

### If We All Pull Together As A Team

The goal of this lab is to deepen your understanding of abstract super classes and git by **collaboratively** implementing five shape classes (Circle, Right Triangle, Square, Octagon, and Hectagon), using a pair of abstract classes.

#### Steps

- (1) Form groups of about twelve :) Each group needs a cloner. The rest of the group should come up with a group name.
- (2) The cloner should visit the following page and create a repo using the selected group name.  
<https://classroom.github.com/g/kmEUkMPo>  
Then pass on the “clone with SSH” URL to the rest of the group.
- (3) Each group needs to divide into five teams of two or three (preferable teaming up with different people than last time) and then argue with the other teams about which shape your team will implement. No bloodshed please.
- (4) Each team needs a driver. The driver should log into a peanuts box and then (after doing a `cd cs312`) clone the repo created by your group’s cloner.
- (5) The clone will include the classes `Shape`, `RegularPolygon`, and `Tester`.
- (6) Add a class for your shape. You can edit using `vi` or `eclipse`. If you use `eclipse`, first import the code into a new project.  
  
Note that `Square` is-a `RegularPolygon`, `Octagon` is-a `RegularPolygon`, and `Hectagon` is-a `RegularPolygon` while then other classes are direct subclasses of `Shape`.
- (7) Test your code by adding a test case or two to `Tester.java`.
- (8) Commit your changes using an informative commit message.  
**(Before pushing any changes, make sure to pull.)**  
(If there are merge conflicts, fix them and then commit again.)
- (9) Push your changes.
- (10) Once all groups have finished, pull the updated code, compile it, and then give it a test drive!

#### Constructor Details

The constructor for a square takes a color and a side length.  
The constructor for a right triangle takes a color, a base, and a height.  
The constructor for a circle takes a color and a radius.  
The constructor for a octagon takes a color and a side length.  
The constructor for a hectagon takes a color and a side length. It has 100 sides!

**Some Maths** (from <https://www.wikihow.com/Calculate-the-Area-of-a-Polygon>)

For a regular polygon

$$\text{area} = 0.5 * \text{perimeter} * \text{apothems}$$

where

$$\text{apothems} = \text{side-length} / (2 * \tan(\text{PI}/\text{sides})).$$

Thus for a square with a side length of 3

$$\text{apothems} = 3 / (2 * \tan(\text{PI}/4)) \rightarrow 3/2$$

$$\text{area} = 0.5 * 12 * (3/2) \rightarrow 9.$$