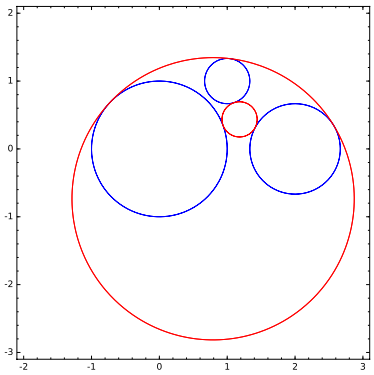
MCS 320 Project Three : an interact for the Appolonius circle problem

The goal of the project is to use Sage to make an interact of the circle problem of Appolonius. This problem asks for the number of circles which touch three given circles. We encountered this problem in lecture 27, where we made a picture for two solutions:



1. computing all solutions

The picture above shows only two solutions. Draw a picture which shows all eight solutions. This exercise asks to complete the construction in lecture 27. Select good values for the input circles so all eight solutions look good on a picture. These values for the input circles can then serve as the default values for the parameters in the interact of the second part.

2. the sliders of the interact

The input to the Appolonius problem consists of three circles. The first circle we can take equal to the unit circle, centered at $(0,0)$ and with radius 1, defined as $x^2+y^2-1=0$. As the center of the second circle, we can take $(c,0)$ and radius r, with equation $(x-c)^2+y^2-r^2=0$. The third circle is general: $(x-a)^2+(y-b)^2-R^2=0$, so with center (a,b) and radius R. There are five parameters:

1. c is the parameter for the center $(c,0)$ of the second circle.
2. r is the radius of the second circle.
3. a is the parameter for the center (a,b) of the third circle.
4. b is the parameter for the center (a,b) of the third circle.
5. R is the radius of the third circle.

Define five sliders for the interact and determine sensible ranges for the parameters. Sensible ranges avoid degenerate inputs, for example: all three circles should never coincide with each other, the radius of each circle should be positive, etc. Select good default values for the parameters, which show a nice solution.

3. deploy the interact

Use you account at `people.uic.edu` to deploy the interact from your personal web page.

the deadline is Friday 29 April 2016 at 11AM

Bring *your* solution to the project to class. The *your* is emphasized to stress that your solution is the result of an *individual* effort. Collaborations are **not** permitted.

The solution to this project consists in two parts:

1. A print out of the Sage notebook or SageMathCloud worksheet that you bring to class.

   Deliver a well written document, with grammatically correct and complete sentences, without spelling mistakes, appropriately structured into sections and subsections.

   The printed version must contain all relevant plots.

2. The Sage notebook/worksheet that you email as an attachment to me.

   The notebook/worksheet should run as a computer program, from top to bottom with consistent output and without errors.

3. Provide the link to the URL of your web page at `people.uic.edu` where your interact is deployed and ready to run.

If you have questions or difficulties, feel free to come to my office for help.