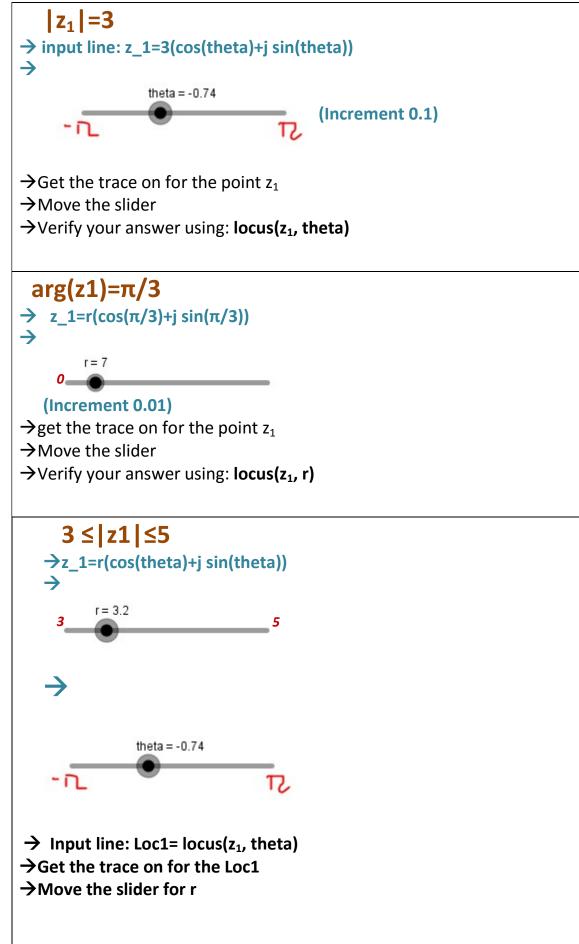
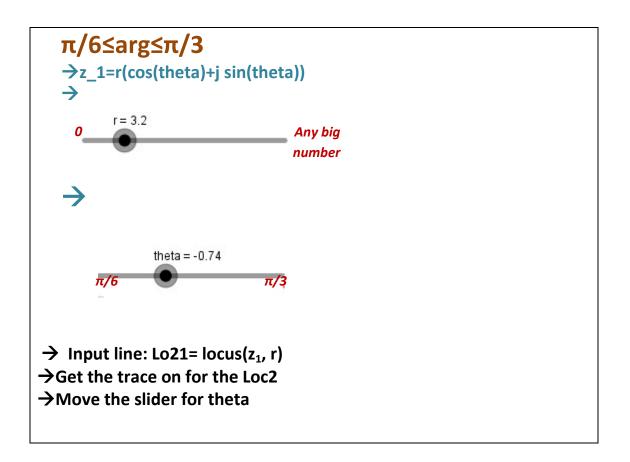
VISUALISING COMPLEX LOCI USING GEOGEBRA (PART A)

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### **Brief guidelines**





### Your challenge

Draw on Argand diagram the set of points  $z_1$  for which

 $\pi/6 \leq \arg(z_1) \leq 5 \text{ AND } 3 \leq |z_1| \leq 5$ 

### **Analytic guidelines**

# Loci 1: Draw on Argand diagram the set of points $z_1$ for which $|z_1|=3$

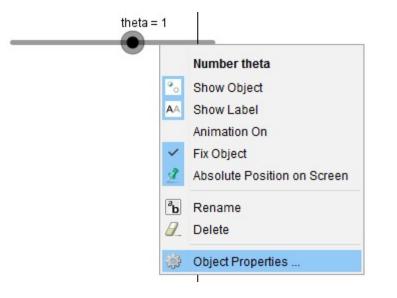
1.

#### Input: z\_1=3\*(cos(theta)+ i sin(theta))

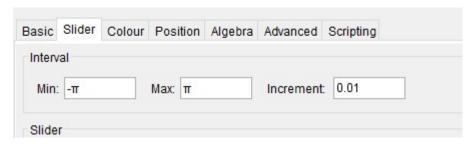
### 2.

Create S	liders		×
a=2	Create slider(s	) for: theta	
Cros	ate Sliders	Cancel	

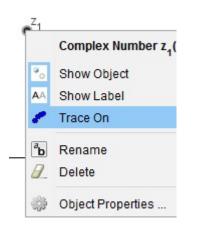
3.



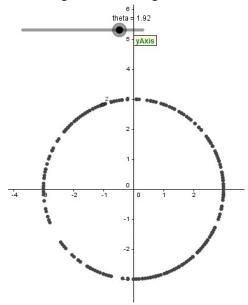
4.



5.



6. moving the slider we get



7. to verify our findings

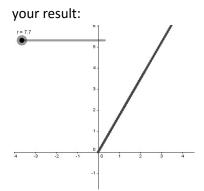
Locus[z\_1, theta]

# Loci 2: Draw on Argand diagram the set of points $z_1$ for which $arg(z_1)=\pi/3$

	Input: Z_1=r*(cos(pi/3)+ í sin(pi/3))
	Create Sliders ×
	a=2 Create slider(s) for: r
	Create Sliders Cancel
ri	ght click on slider r
	4 Number r
	Show Object
	Animation On
	Fix Object
	Absolute Position on Screen
	1 B Rename
	🧟 Delete
-	0 🎲 Object Properties
4	-3 -2 -1 1 - 2 -3
	Basic Slider Colour Position Algebra Advanced Scripting
	Basic Slider Colour Position Algebra Advanced Scripting
	Interval Min: 0 Max: 500 Increment: 0.1
	Interval
	Min: 0 Max: 500 Increment: 0.1
	Interval Min: 0 Max: 500 Increment: 0.1
	Interval Min: 0 Max: 500 Increment: 0.1 Slider
	Interval Min: 0 Max: 500 Increment: 0.1 Slider
	Interval Min: 0 Max: 500 Increment: 0.1 Slider
	Interval Min: 0 Max: 500 Increment: 0.1 Slider Z1 Complex Number z1 Show Object
	Interval Min: 0 Max: 500 Increment: 0.1 Slider Z1 Complex Number z1 Show Object Show Label

6. move slider r

Object Properties ...



7. to verify your findings

**Locus**[**z\_1**, **r**] So the loci is half a line with initial point the axis origin.

# Loci 3: Draw on Argand diagram the set of points $z_1$ for which $3 \le |z_1| \le 5$

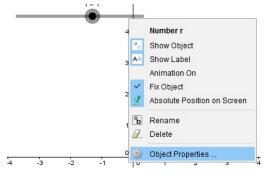
.

Input: Z_1=I	r(cos(theta)+ í sin(theta))
•	
Create Sliders	×
a=2 Create slider(s) for:	theta
Create Sliders	Cancel
Create Sliders	×
a=2 Create slider(s)	for: r
Create Sliders	Cancel
theta = 1	
	Number theta
°0	Show Object
AA	
	Animation On
~	Fix Object
3	Absolute Position on Screen
ďb	Rename
	Delete
100	Object Properties

#### 5.

Basic	Slider	Colour	Positio	n Algebra	Advanced	Scripting
Interv	al					
Min	-π		Max: π	-	Increment	0.01

#### 6. right click on slider r



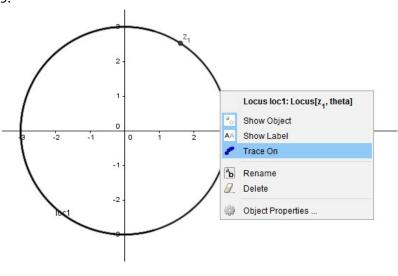
7.

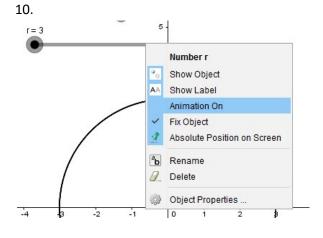
Basic	Slider	Colour	Posi	ition	Algebra	Advanced	Scripting
Interv	al						
Min:	3		Max:	5		Incremen	t 0.1

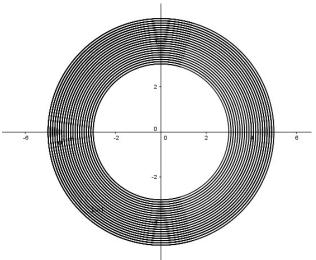
#### 8.

#### Locus[z\_1, theta]









This is called **annulus** and it's the a plane figure consisting of the area between the pair of concentric circles: one with radius 3 and another with radius 5.

# Loci 4: Draw on Argand diagram the set of points $z_1$ for which $\pi/6 \le \arg(z_1) \le \pi/3$

-

Input: z_1=r	(cos(theta)+ í sin(theta))
2. Create Sliders a=2 Create slider(s) for: t Create Sliders	heta Cancel
Create Sliders Create Slider(s) for Create Sliders 4.	X or: r Cancel
theta = 1	Number theta Show Object Show Label Animation On Fix Object Absolute Position on Screen Rename Delete Object Properties

5.

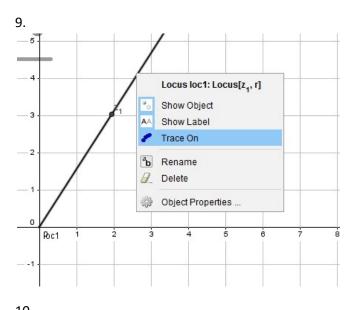
Preference	s						
	<b>X %</b>						
Number	Basic Slide	Colour	Position	Algebra	Advanced	Scripting	
	Interval						
	Min: π/6		Max: π/3	3	Increment	0.01	

#### 6. right click on slider r

				4	Number r
				0	Show Object
				3 🗛	Show Label
					Animation On
				~	Fix Object
				2	Absolute Position on Screen
				Ъ	Rename
				0	Delete
	-			0	Object Properties
ŧ	-3	-2	-1	19	1 2 3

7.
Basic Slider Colour Position Algebra Advanced Scripting
Interval
Min: 0 Max: 500 Increment: 0.1
Slider

### Locus[z\_1, r]



10. theta = 1 Number theta r = 3.6 Show Object AA Show Label Animation On Fix Object Absolute Position on Screen <sup>a</sup>b Rename Delete Object Properties ... 0 4 -3 -2 -1 Roc1 2 ŝ 4 5

### your result

