

Fractals & Chaos
Complex Paint Worksheet Part 1 – Linear Functions

Name: _____

Part I – Linear ($Az + B$)

	A=	B =	A in Polar Form	What happens? (approximated fixed point, attracting/repelling, pattern of points going in/out)
1)	1	$.5 - i$		
2)	.4	0		
3)	.4	i		
4)	i	0		
5)	$.9i$	i		
6)	$.9i$	$.5 - .5i$		
7)	$-.4 + .9i$	2		
8)	$1.01i$	i		

Part II – Polar-Linear – $A = [R, T]$

R = length of A; T = fraction of full rotation of A

Keep B = 0 (so the fixed point = 0) and try various values of R and T

R	T	What happens?	R	T	What happens?
.3	1/3		.9	.32	
.7	1/3		.99	.32	
.9	1/3		.9, .95, .99,...	15/62	
1.2	1/3		.9, etc.	5/17	
1.6	1/3		.9, etc.	π	
.8	3/5		.9, etc.	ϕ	

See the back for important questions to think about (and develop answers to!) as you explore what this program allows you to do.

Complex Paint Questions – Linear Lab

1. What is the effect of A on what happens under iteration? More specifically, what are the effects of R and T, the length and angle of A?
2. What is the effect of B?
3. State 3 different ways to find a fixed point. When is there **no** fixed point?
4. A fixed point will attract if _____ and repel if _____.
5. What determines how fast the attraction/repulsion is?
6. What creates the spokes or spirals?
7. What determines **how many** spokes there are?
8. What determines **how tight** the spiral is?
9. Can you create a linear function that...
 - a. Is attracted to (1,1)?
 - b. Converges with 12 spokes?
 - c. Has 5 spiral arms converging clockwise?