

Two-Variable Function Pump Exploration Questions

To understand the Mandelbrot set, we need to work with two-variable (complex) functions.

1. Practice your complex arithmetic by performing the following operations:
 1. $(0,-1) + (1/2,1/3)$
 2. $(.8,-.2) + (.1,-.3)$
 3. $(0,1)^2$
 4. $(.8,-.3)^2$
 5. $(1,.2)^2 + (-.2,.5)$
 6. $(.5,.5)^2 + (.5,.5)$
2. Iterate the function: $f(Z) = Z^2$ with the starting points $(0,0)$, $(1,0)$, $(.5,.5)$, and $(1,1)$. Calculate enough iterations for each to tell if it is a prisoner, escapee or neither.

3. Try more starting points with $f(Z) = Z^2$. Can you guess what the prisoner set looks like?

4. Explore the function $f(Z) = Z^2 + (.5, .5)$ by choosing 10 starting values. Record your results. Can you find any prisoners?

5. Experiment with other C values, checking at least 5 starting points for each, and record your results.