

## Henon Map\*

The Henon Map visualization gives the orbit under iteration of the map  $(x, y) \rightarrow (y + 1 - aa \ x^2, bb \ x)$ .

The default values are  $aa = 1.4$  and  $bb = 0.3$ . The initial point is  $(x, y) = (cc, dd)$  with the defaults  $cc = 1.0, dd = 1.0$ . The number of iterations plotted is  $ee$ , but the first  $ff$  iterates are omitted. The defaults are  $ee = 3000$  and  $ff = 20$ . – We obtain an attracting orbit of period 6 with  $aa = 1.45$ . To see it, change  $aa$ , stop the iteration and click in the Action Menu: **Do 500 Iterations**.

In 3DXM, to move the finished image, drag the image with the mouse. To zoom in our out, drag vertically with the Shift key pressed. (If you zoom in, you might want to increase parameter  $ee$  using Settings > Set Parameters.)

To zoom into a particular region, hold down Command and then drag a rectangle in the window, then the program will zoom into that region of the Henon attractor, allowing you to see it in greater detail.

(Morphing  $aa$  and  $bb$  works, but there is no default morph, so first select Set Morphing... from the Settings menu to set up the morph—be sure to click the Init To Current Values button, then change  $aa0$   $aa1$ ,  $bb0$  and  $bb1$ .)

Finally, we added to the Action Menu: **Use Hit Count**

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\* This file is from the 3D-XplorMath project. Please see:

<http://3D-XplorMath.org/>

**Coloration.** This changes the representation by adding vertical bars over the points of the Henon attractor. The length of these bars shows how often that - pixelsized - point of the attractor is visited during the iteration. The graphic therefore illustrates the iteration-invariant measure on the attractor. For a 1-dimensional such hit count see the Feigenbaum Tree.

H.K.