

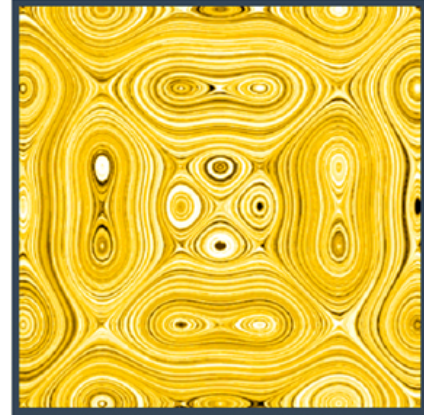
The 8.02 “Weird Fields” Contest

This Contest Is NOT Required and Will in No Way Affect Your Grade in 8.02

Rules: To win this contest you must construct the “weirdest” two-dimensional vector field using simple analytic functions. An example of the weird fields that come out of simple functions, consider the following:

$$\vec{F}(x, y) = g(x, y)\hat{i} + h(x, y)\hat{j} = y \cos(y)\hat{i} + x \cos(x)\hat{j}$$

This vector field has the “grass seeds” representation shown in the panel on the right.



History: The spring 2004 winner and runner up were featured in [a TechTalk article](#). Nicki Lehrer’s entry in the spring 2004 contest, made it to a [full page](#) of Wired Magazine in September of 2004 and to [Discover Magazine’s Online](#) site. The fall 2004 winning entry from Michael McGraw-Herdeg was part of an exhibit that ran at the MIT Museum. Our [contest winners](#) continue to get fame (including inclusion in the applet!)

Why: We want to encourage you to get familiar with the idea of vector fields and what they look like by playing with the “[Field Mapping](#)” applet we have developed. If you do not have a fast CPU using the machines in the Athena PC cluster in Building 37-312. For the availability of machines in that cluster, go to

<http://web.mit.edu/windows/cluster/calendar/>

The 8.02 staff will choose a handful of semi-finalists from the patterns submitted. We will hold a vote in each section of 8.02 for the weirdest field of those as gauged by student opinion.

How To Enter: Use the Field Mapping applet to construct a field map. Print out a “screen capture” (“alt print scrn” on a PC, then paste into a word document, or you can “Save Image,” which saves in JPEG format (.jpg)) and submit it as hardcopy to the box labeled “Weird Fields Contest” in class on the due date of the Second Problem Set of the term (do **NOT** attach it to your problem set due that day). We must be able to read the equations you are using. Put your name, section, and email on your entry.

Hints: We are looking for relatively simple analytic expressions that lead to striking images. If you want to images with a lot of swirls and no sources, choose function such that if $\vec{F}(x, y) = g(x, y)\hat{i} + h(x, y)\hat{j}$, $\frac{\partial g(x, y)}{\partial x} + \frac{\partial h(x, y)}{\partial y} = 0$. If you want a pattern that

has lots of sources and no swirls, choose g and h such that $\frac{\partial g(x, y)}{\partial y} - \frac{\partial h(x, y)}{\partial x} = 0$.

Partial derivatives are just normal derivatives holding the other variables fixed. For

example, $\frac{\partial}{\partial y} [xy^3] = 3xy^2$