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5. Contour plots and level curves

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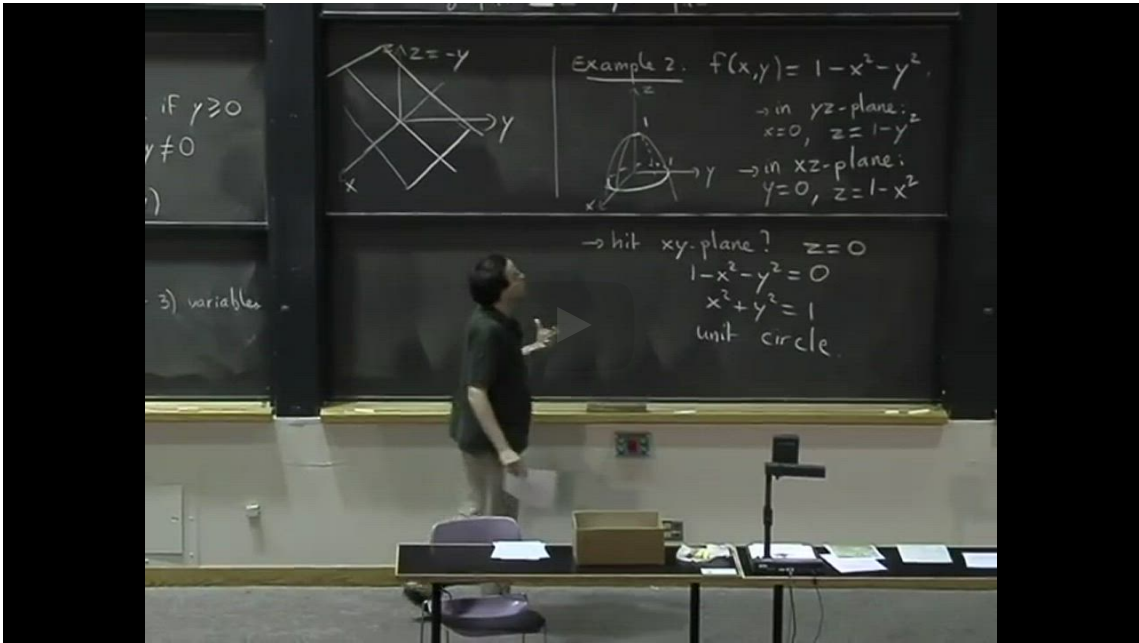
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Explore

Contour plots

[Start of transcript. Skip to the end.](#)



PROFESSOR: So there's another way to plot functions of two variables, and that's called the contour plot. So the contour plot is a very elegant solution to the problem that it's difficult to draw space pictures on a sheet of paper or on a blackboard. So instead, let's try to represent the function



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Definition 5.1 The **contour plot** of a function $f(x,y)$ is a collection of level curves $f(x,y) = k$ where the heights k are separated by equal intervals.

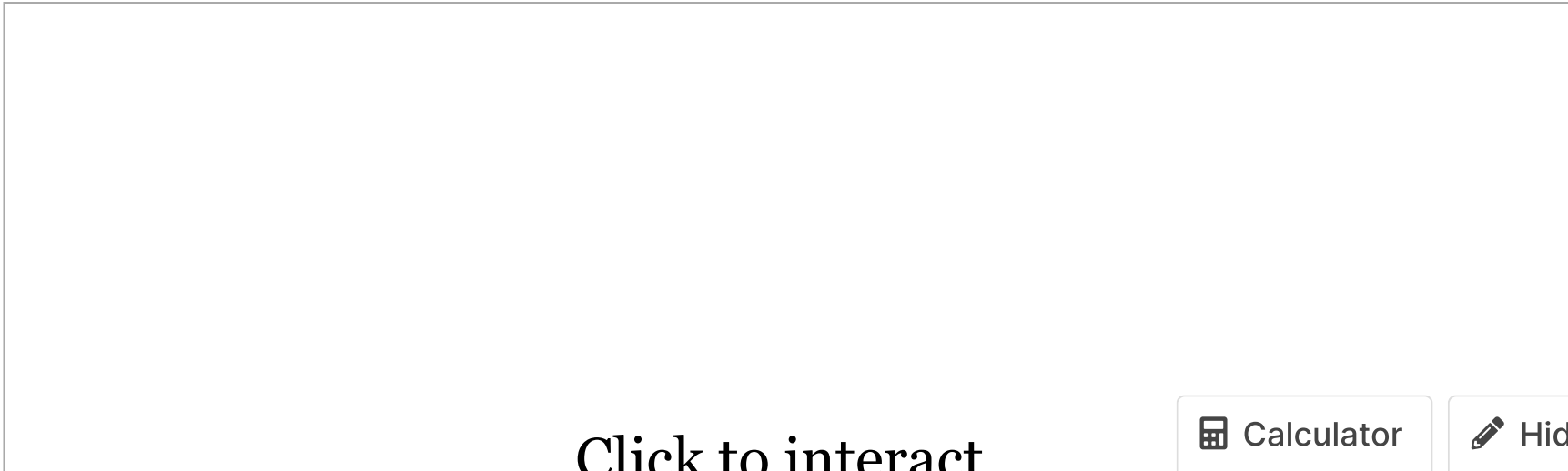
Let's consider the function

$$f(x,y) = x^2 + y^2 + \frac{1}{2}x - \frac{1}{4}(x^2 + y^2)^2$$

(2.5)

which is plotted below.

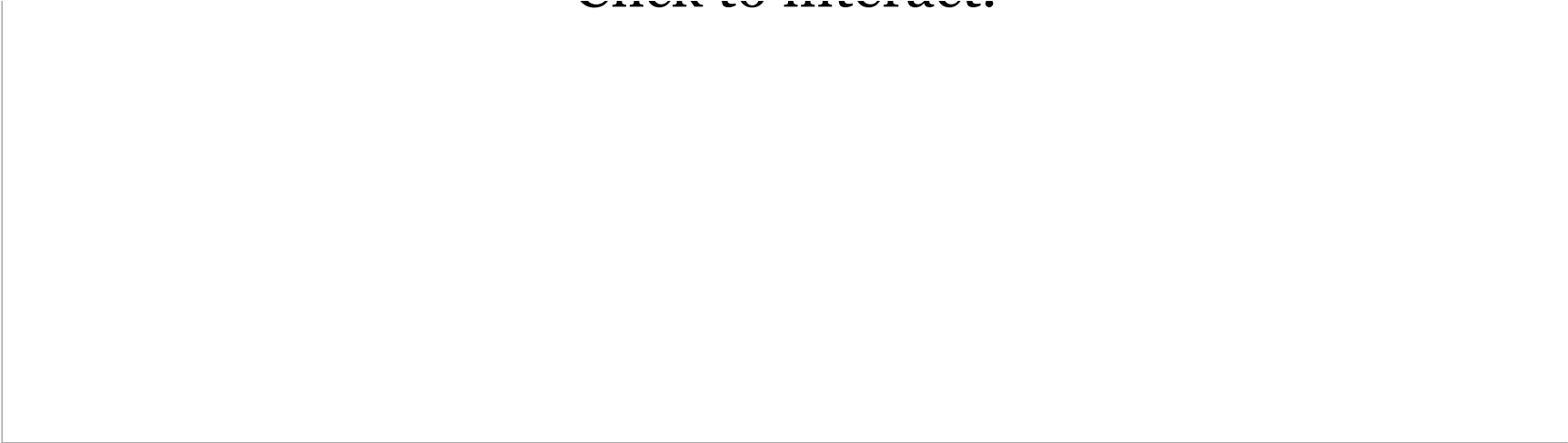
► **Graph of the function above**



Click to interact.

Calculator

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The interactive mathlet below shows the level curves of this function on the left and the surface in three-dimensional space on the right. Use the slider to change the value of k to compare level curves $f(x,y) = k$. On the right, you will see the level curves represented as a horizontal cross-section of the three-dimensional surface.

► Heights of Level Curves

Equation 1 $z = f(x,y) = (x^2 + y^2) + 0.5x - 0.25(x^2 + y^2)^2$

z value0.520

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5. Contour plots and level curves

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Topic: Unit 1: Functions of two variables / 5. Contour plots and level curves

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< Previous

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