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6. Geometric interpretation of directional derivatives

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Pro tip: You must enable 3rd party cookies so that you can interact with the mathlet below.

The following mathlet allows you to visualize geometrically the slope that is computed by the directional derivative.

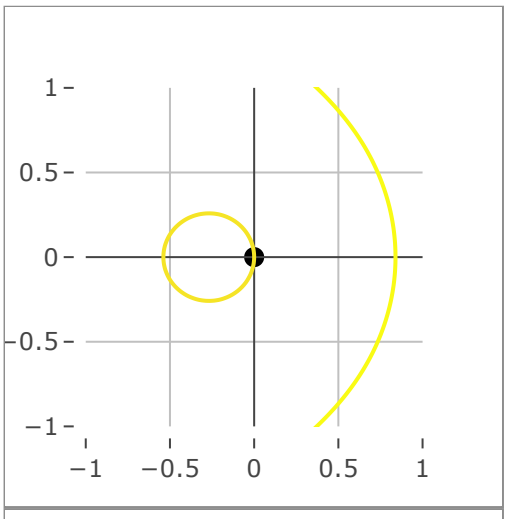
- The top left window allows you to choose the x and y coordinate of the point at which you wish to see the directional derivative. Level curves help orient you to the function. Click on any location in the window to select that point.
- The right window shows the graph $z = f(x, y)$ of the equation selected by the dropdown menu at the top of the page. A plane of width 2 is shown intersecting the surface through the point selected in the top left window.
- The angle of the plane, giving the direction for the directional derivative, is selected using the slider at the bottom left of the page.
- The bottom left window shows the curve that is the intersection of the plane with the surface. This curve is shown in the coordinates of the plane. The origin corresponds to the point $(x, y, 0)$ selected in the top left window. The slope of this line at zero is the directional derivative.

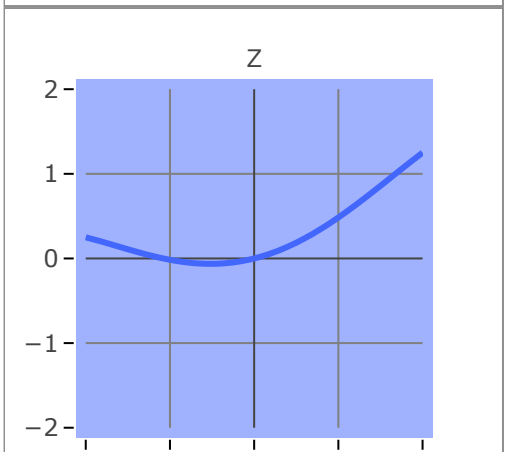
Things to try:

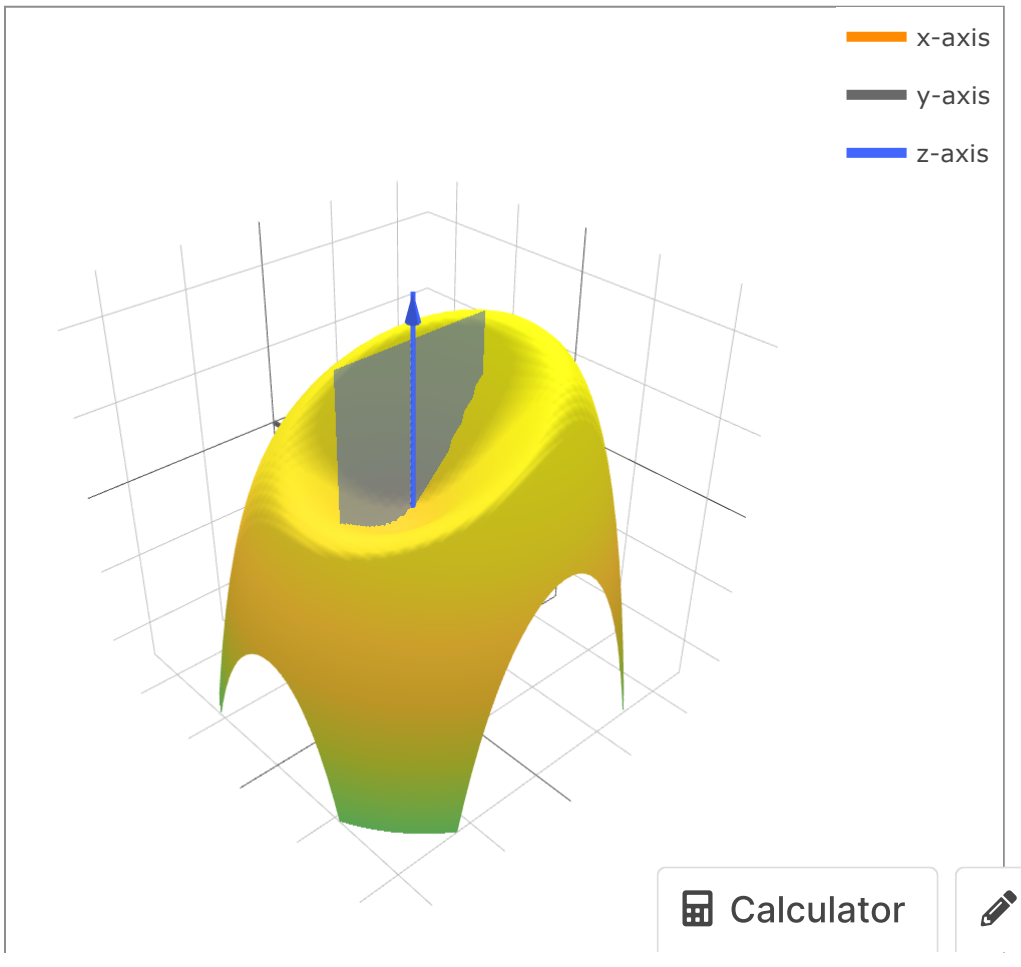
- Use the slider to change the angle of the plane intersecting the surface on the right. View the intersection curve in the window on the left.
- Try changing the function using the dropdown menu.
- Change the point by clicking anywhere in the upper left window.

▸ **Directional Derivative**

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







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angle 0.00π

☐ 3D labels ☐ 3D zoom

Questions:

- Why is the slope of the plane (equation 3) positive for angles 0 and 2π and negative for angle π?
- What does the horizontal axis in the lower left window correspond to in the 3D picture on the right?

PLEASE RATE THIS MATHLET
(Use a one star to five star rating scale.)

RESULTS

☆	**1%**
☆ ☆	**1%**
☆ ☆ ☆	**6%**
☆ ☆ ☆ ☆	**22%**
☆ ☆ ☆ ☆ ☆	**71%**

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Results gathered from 309 respondents.

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Your response has been recorded

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6. Geometric interpretation of directional derivatives

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? graph for equation 3 — 2
The graph for equation 3 on the mathlet doesn't look right. It says z=-x/4+y/2

Feature request: a slider to control zoom — 2
It is hard to control the zoom with the mouse. I found myself unable to zoom out after zooming in a lot. A slider as an alternative way...

Geometric interpretation of directional derivatives — 4

what happened to the rating stars? — 2
This mathlet asked us to rate it - for some reason the rating facility disappeared while I was playing with the mathlet, before I had a ...

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