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17. Sea surface temperature

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NASA's Jet Propulsion Laboratory (JPL) hosts a webpage called State Of The Oceans (SOTO) that allows you to interact with maps that help us visualize ocean data. The image below shows the sea surface temperature (in degrees Celsius) on April 7, 2020. The colors correspond to level curves on the map.

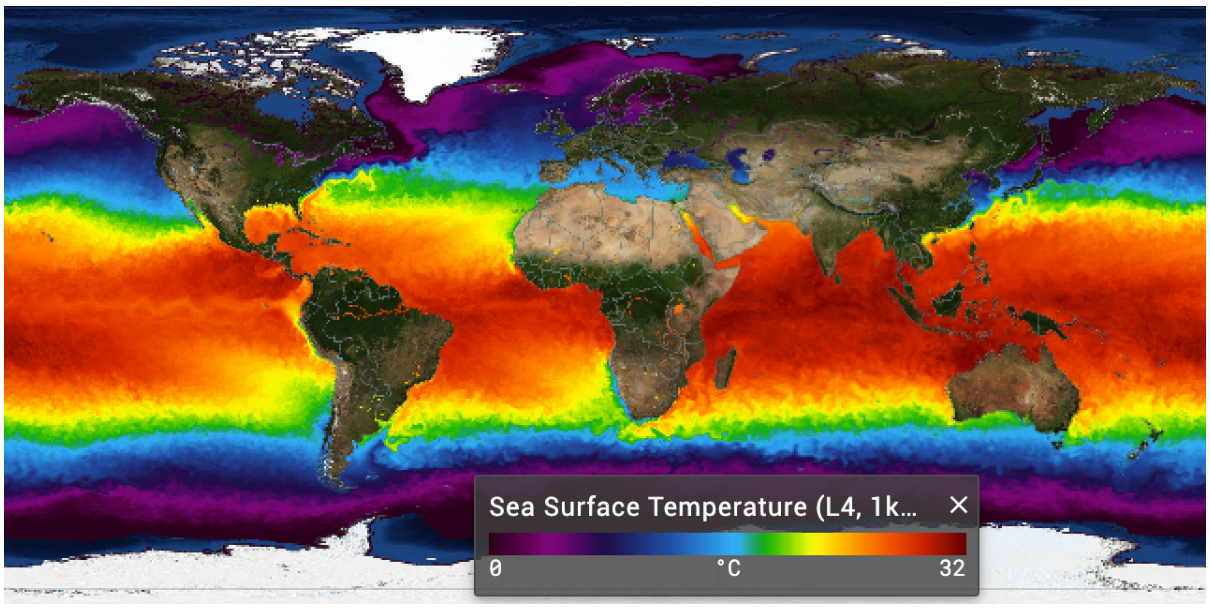
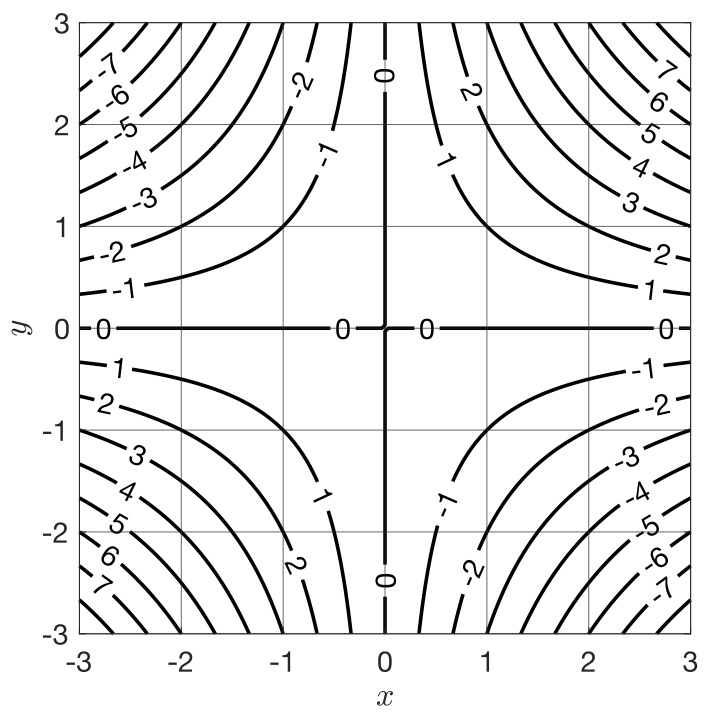


Image accessed April 7, 2020 from (https://podaac.jpl.nasa.gov/)

Suppose we zoomed in to a very small region on the map, converted the coloring to level curves for visual clarity, and obtained the figure shown below.



Say that the level curves above are the level curves of a temperature function $T(x, y)$, where $T(x, y)$ denotes the temperature of the ocean at longitude x and latitude y. (We will assume that the x and y-axes have been rescaled to correspond to the values shown.)

The partial derivative with respect to x tells us how the temperature changes if we move in the x-direction. Similarly, the partial derivative with respect to y tells us how the temperature changes if we move in the y-direction. In this example, these derivatives tell us how the temperature of the ocean changes if we move east or north.

Positive, negative, or zero

6/6 points (graded)

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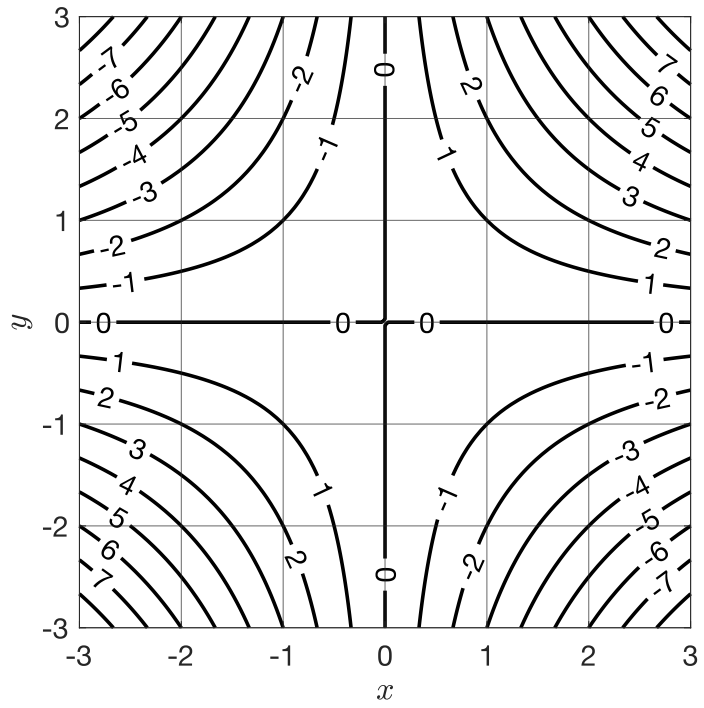


From looking at the level curves, determine whether each of the following values are positive, negative, or zero. Use that information to interpret how temperature is changing.

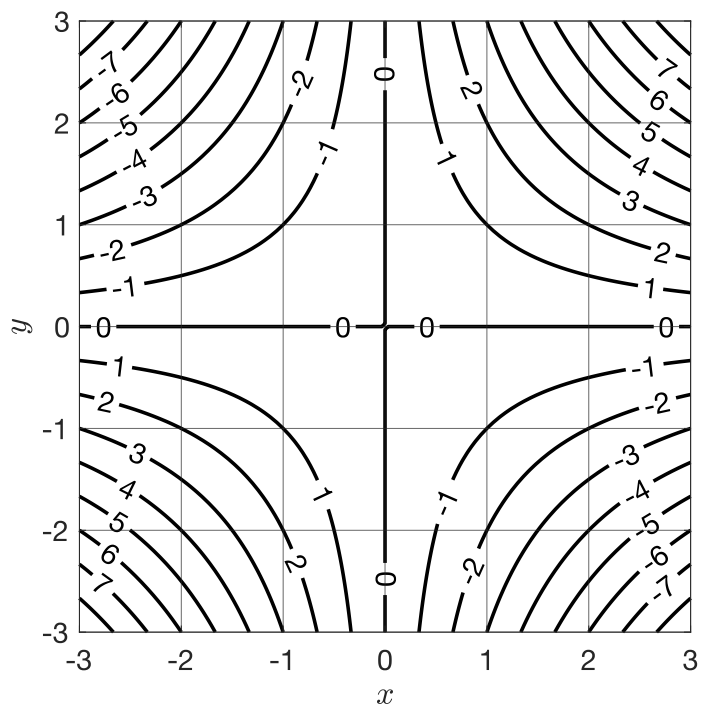
$T_x\,(1,1)$:	Positive ✔ **Answer:** Positive		At $(1,1)$, the temperature is	increasing ✔ **Answer:** increasing		to the east
$T_y\,(0,-1)$:	Zero ✔ **Answer:** Zero		At $(0,-1)$, the temperature is	constant ✔ **Answer:** constant		to the north
$T_y\,(-1,-1)$:	Negative ✔ **Answer:** Negative		At $(-1,-1)$, the temperature is	decreasing ✔ **Answer:** decreasing		to the north

Submit You have used 2 of 5 attempts

Answers are displayed within the problem

Compare partial derivatives 1

1/1 point (graded)



By looking at the level curves, decide which is greater: the temperature change to the north at the point $(1,0)$ given by $T_y\,(1,0)$, or the temperature change to the north at the point $(2,0)$ given b

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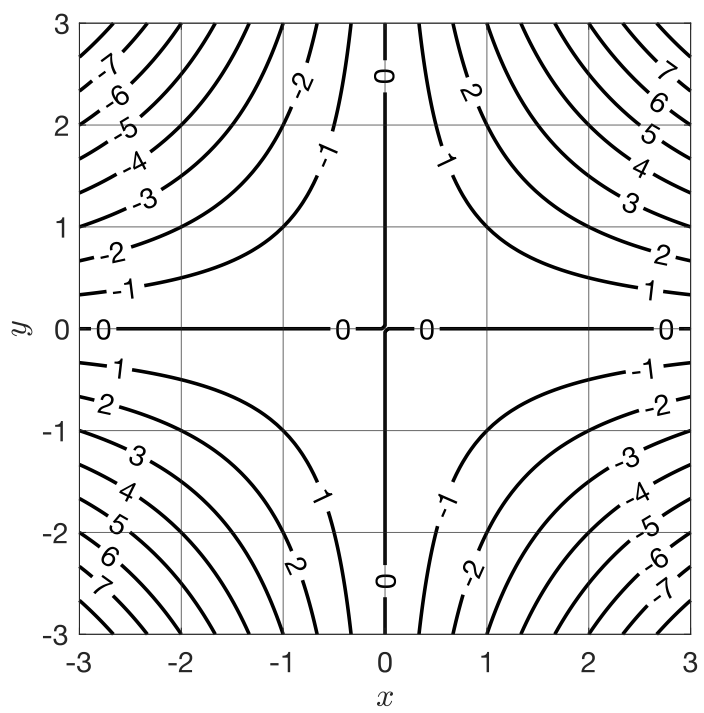
- ○ $T_y\,(1,0)$
- ◉ $T_y\,(2,0)$

✔

Submit You have used 1 of 1 attempt

Compare partial derivatives 2

1/1 point (graded)



By looking at the level curves, decide which is greater: the temperature change to the east at the point $(2,1)$ given by $T_x\,(2,1)$ or the temperature change to the north at the point $(2,1)$ given by $T_y\,(2,1)$.

- ○ $T_x\,(2,1)$
- ◉ $T_y\,(2,1)$

✔

Submit You have used 1 of 1 attempt

17. Sea surface temperature

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? Strange question Ty(-1,-1) 2
If Ty(-1,-1) is taken positive (level 1), then moving north it must decrease (graded as WRONG); if it is taken as zero (i.e. at the very ed...

Axes labels 5
I'm confused if the labels x and y are labeling the axes or if we should be interpreting the graphs more like the usual x-y plane. I'm n...

? Positive, negative, or zero

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Greetings. Could someone please explain why Ty(-1,-1) for the 'Positive, negative, or zero' question's value is negative?

? Query in 'positive, negative or zero' — 2

Can someone explain the logic- At (1,1), the temperature is increasing towards east? Also, why the partial derivative is positive?

I think there is a small typo — 8

First thanks a lot to the staff for the mooc. For the first exercise positive, negative of constant the temperature is (positive, negative ...

‹ Previous Next ›

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