

## directional derivative,

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A problem asks me to show that no real-valued function  $f$  has a positive directional derivative at a fixed point  $c$  for every possible direction  $u$ .

But wouldn't a paraboloid work? Fix  $c$  corresponding to the vertex. Then for any direction  $u$ , the slope will always be positive (increasing).

To be clear, the exact problem is worded: Prove that there is no real-valued function  $f$  such that  $f'(c;u) > 0$  for a fixed point  $c$  in  $\mathbb{R}^n$  and every nonzero vector  $u$  in  $\mathbb{R}^n$ .

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