You are taking "Exam (Timed, No Correctness Feedback)" as a timed exam. Show more

End My Exam 25:56:12

Previous Next

1. Exploration of critical points

Bookmark this page

Recitation due Sep 13, 2021 20:30 IST Completed

Explore

Compute the gradient

2/2 points (graded)

We want to understand the shape of the function $f(x,y) = x^3 + y^3$.

Compute the gradient $\nabla f(x,y) = \langle f_x(x,y), f_y(x,y) \rangle$.

$f_x(x,y) =$ 3*x^2

$3 \cdot x^2$

✔ **Answer:** 3*x^2

$f_y(x,y) =$ 3*y^2

$3 \cdot y^2$

✔ **Answer:** 3*y^2

Submit You have used 1 of 5 attempts

Answers are displayed within the problem

Find the critical point(s)

1.0/1 point (graded)

Find the critical point(s) of the function $f(x,y) = x^3 + y^3$.

(Enter critical points as ordered pairs surrounded by round brackets and separated by commas. Separate more than one critical point using semicolons: .e.g. `(pi, pi); (1,-1)` .)

(0,0) ✔

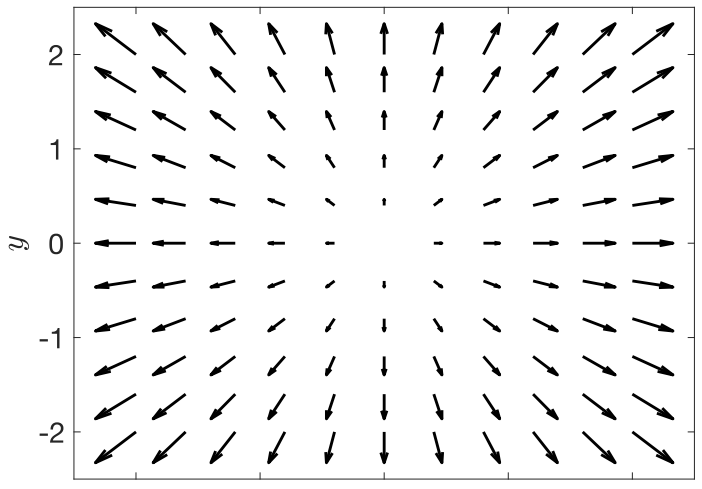
Submit You have used 1 of 5 attempts

Identify the gradient

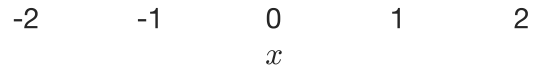
1/1 point (graded)

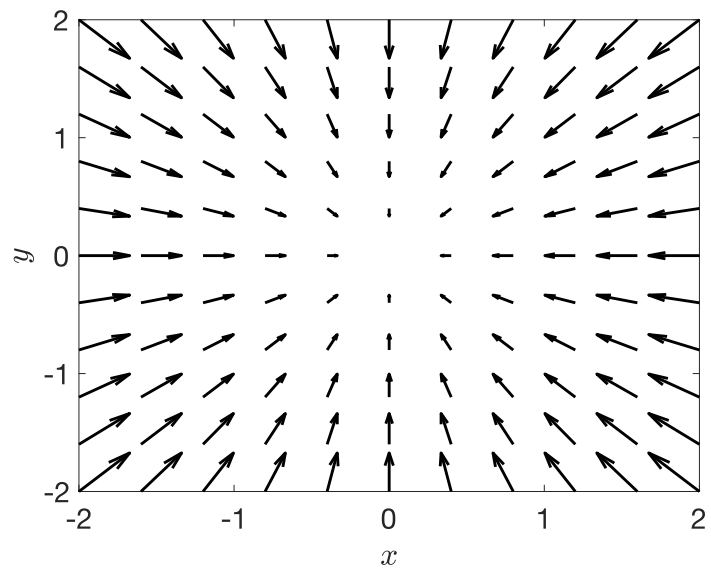
$f(x,y) = x^3 + y^3$

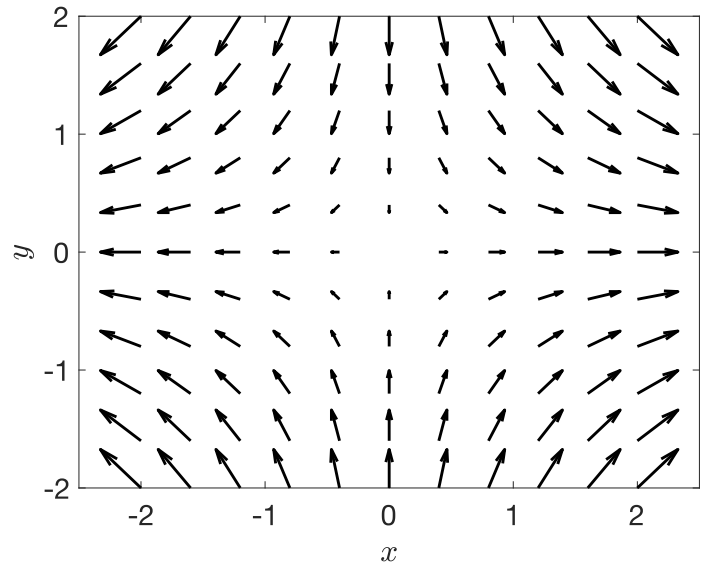
Which of the following is the gradient field of $f(x,y)$?

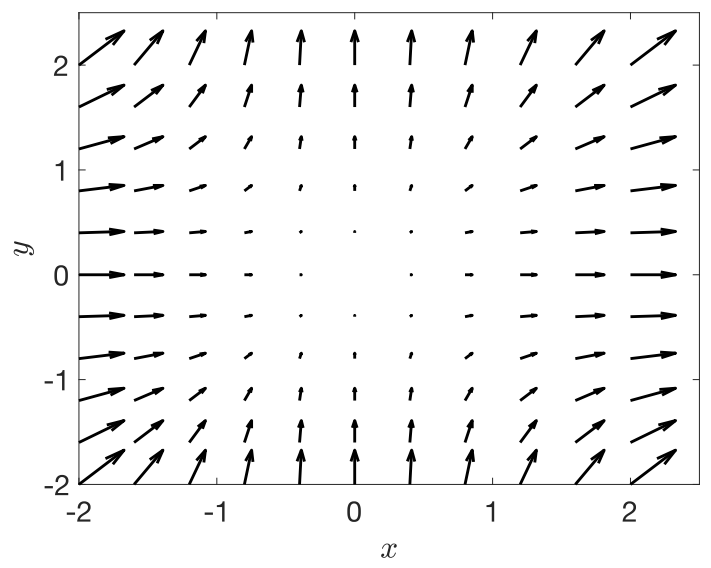


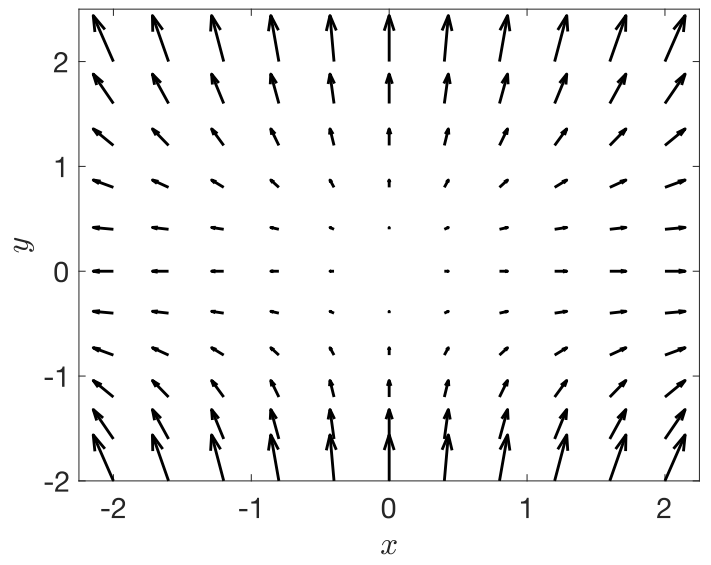
Calculator Hide Notes











Calculator Hide Notes

Submit You have used 1 of 3 attempts

Answers are displayed within the problem

Analyze the critical point

1/1 point (graded)

Using the 2nd derivative test for the function $f(x,y) = x^3 + y^3$. What type of critical point is the origin?

- Local maximum
- Local minimum
- Saddle point
- Inconclusive ✔

Solution:

The second derivative test is inconclusive because

$$f_{xx}(0,0) = 0 \quad (4.106)$$
$$f_{yy}(0,0) = 0 \quad (4.107)$$
$$f_{xy}(0,0) = 0 \quad (4.108)$$

Using the gradient field we determined in the problem above, we see that the function is increasing in some directions, and decreasing in others, and thus is classified as a saddle point. Thus this is known as a degenerate saddle.

Submit You have used 2 of 3 attempts

Answers are displayed within the problem

1. Exploration of critical points

Topic: Unit 3: Optimization / 1. Exploration of critical points

Hide Discussion

Add a Post

Show all posts by recent activity

- [Staff] "Could not format HTML for problem. Contact course staff in the discussion forum for assistance." — I get this error in area after first problem, and when I navigate from this page it's not marked as completed "Could not format HTML f... — 4
- Drawing Vector Fields in Python — I found a nice resource for drawing vector fields in Python for those who may be interested. Obviously you do not want to become e... — 3
- degenerate saddle — Hello, I wonder why for the above problem the saddle is called *degenerate* saddle? I mean why not call it *inconclusive* saddle? T... — 5

© All Rights Reserved

edX

About
Affiliates
edX for Business
Open edX
Careers
News

Legal

Terms of Service & Honor Code
Privacy Policy
Accessibility Policy
Trademark Policy
Sitemap

Connect

Blog
Contact Us
Help Center
Media Kit
Donate

GET IT ON Google play
Download on the App Store

© 2021 edX Inc. All rights reserved.
深圳市恒宇博科技有限公司 粤ICP备17044299号-2

Calculator Hide Notes