MITx 18.02.1x
Multivariable Calculus 1: Vectors and Derivatives

Help   sandipan_dey ⌄

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🏠 Course / Unit 3: Optimization / Recitation 9: Second derivative test

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3. Practice problems

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Recitation due Sep 13, 2021 20:30 IST   Completed

Practice

Find and classify the critical points 1

6.0/6 points (graded)

Let $f(x, y) = \dfrac{1}{2}x^4 + y^2 - 8xy + 3$.

Find the critical points of f, and classify each as a local minimum, local maximum, or saddle point.

(In the first column, enter a critical point between round parentheses, e.g. `(a,b)` . In the second column, enter the word `min` for a local minimum, `max` for a local maximum, `saddle` for a saddle point, or `other` for a degenerate point.)

Critical point	Type of critical point
(0,0) ✔	saddle ✔
Answer: (-4,-16)	**Answer:** min
(4,16) ✔	min ✔
Answer: (4,16)	**Answer:** min
(-4,-16) ✔	min ✔
Answer: (0,0)	**Answer:** saddle

Submit   You have used 4 of 15 attempts

ⓘ Answers are displayed within the problem
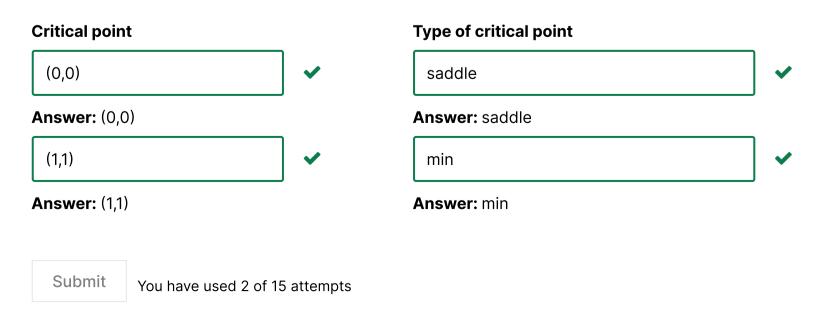

Find and classify the critical points 2

4.0/4 points (graded)

Let $g(x, y) = x^3 + y^3 - 3xy + 1$.

Find the critical points of g, and classify each as a local minimum, local maximum, or saddle point.

(In the first column, enter a critical point between round parentheses, e.g. `(a,b)` . In the second column, enter the word `min` for a local minimum, `max` for a local maximum, `saddle` for a saddle point, or `other` for a degenerate point.)

Critical point	Type of critical point
(0,0) ✔	saddle ✔
Answer: (0,0)	**Answer:** saddle
(1,1) ✔	min ✔
Answer: (1,1)	**Answer:** min

Submit   You have used 2 of 15 attempts

ⓘ Answers are displayed within the problem

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Find and classify the critical points 3

4.0/4 points (graded)

Let $h\left(x,y\right) = \left(x^3 + 1\right)\left(y^3 + 1\right)$.

Find the critical points of h, and classify each as a local minimum, local maximum, or saddle point.

(In the first column, enter a critical point between round parentheses, e.g. `(a,b)` . In the second column, enter the word `min` for a local minimum, `max` for a local maximum, `saddle` for a saddle point, or `other` for a degenerate point.)

Critical point

| (0,0) | ✔ |

Answer: (0,0)

| (-1,-1) | ✔ |

Answer: (-1,-1)

Type of critical point

| other | ✔ |

Answer: saddle

| saddle | ✔ |

Answer: saddle

| Submit | You have used 1 of 15 attempts

ℹ Answers are displayed within the problem

Discuss

For the problem above, find a post that discusses the solution. Compare their approach to yours. Did you use the 2nd derivative test, or graphical methods, and why? (Consider posting your own solution if none exists on the forum!)

3. Practice problems

Topic: Unit 3: Optimization / 3. Practice problems

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💬 **degenerate point**
The degenerate point looks like a "3D" point of inflection. Just my 2 cents worth.   **7**

💬 **[staff] An extension would be really helpful :)**
Hello, in your last email you asked if an extension would be helpful. It would be really nice to see the current deadline extended for a …   **6**

💬 **Smart grader**
I have tested the grader and found it smart: in the case of a degenerated saddle, one can type "saddle" or "other", the grader accept…   **6**

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