

12-7 part 1 example B

①

Find all critical points of

$$f(x,y) = x^3 + y^3 + 3x^2 - 3y^2 - 8$$

and classify them as points where local maxima, minima or saddle points occur.

②

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2

ex

Find all critical points of

$$f(x, y) = x^3 + y^3 + 3x^2 - 3y^2 - 8$$

and classify them as points where local maxima, minima or saddle points occur.

(23)

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$$\begin{cases} f_x(x, y) = 3x^2 + 6x \stackrel{\text{set}}{=} 0 \\ f_y(x, y) = 3y^2 - 6y \stackrel{\text{set}}{=} 0 \end{cases}$$

critical points are:

127

The Discriminant function  $f_{xx}f_{yy} - f_{xy}^2$  ③

$$f_{xx}(x,y) = 6x + 6, \quad f_{yy}(x,y) = 6y - 6$$

$$f_{xy}(x,y) = f_{yx}(x,y) = 0$$

$$f_{xx}(x,y)f_{yy}(x,y) - [f_{xy}(x,y)]^2$$

$$= (6x+6)(6y-6) - [0]^2$$

$$= (6x+6)(6y-6) = \text{discriminant function}$$

critical points

a) (0,0)

b) (0,2)

c) (-2,0)

d) (-2,2)