In-Class Quiz 4: Classifying critical points (§12.8)

Directions: This quiz is due at the end of lecture.

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1. Find and classify the critical points of the function

$$f(x,y) = x^4 + y^4 - 4x - 32y + 10.$$

$f_x = 4x^3 - 4 = 0 \Rightarrow x^3 = 1 \Rightarrow x = 1$

$f_y = 4y^3 - 32 = 0 \Rightarrow y^3 = 8 \Rightarrow y = 2$

CP: $(1,2)$.

$$D(x,y) = \begin{vmatrix} f_{xx} & f_{xy} \\ f_{yx} & f_{yy} \end{vmatrix} = (12x^2)(12y^2) - (0)(0) = 144x^2y^2$$

$D(1,2) = 144(1)^2(2)^2 > 0$

$f_{xx}(1,2) = 12(1)^2 > 0$

$\Rightarrow$ $(1,2)$ gives a local min