

Critical points

1. Find all the critical points of

$$f(x, y) = x^6 + y^3 + 6x - 12y + 7.$$

Answer: Taking the first partials:

$$\frac{\partial z}{\partial x} = 6x^5 + 6 \quad \text{and} \quad \frac{\partial z}{\partial y} = 3y^2 - 12.$$

Setting these equal to 0 gives

$$x^5 = -1 \Rightarrow x = -1 \quad \text{and} \quad 3y^2 = 12 \Rightarrow y = \pm 2.$$

The critical points are $(-1, 2)$ and $(-1, -2)$.

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