Math 136 Homework 9

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1.

Problem. Find the minimum and maximum value of the function $f(x, y) = x^4 + 4y^3 + 5$ on the unit disk $\{(x, y) : x^2 + y^2 \leq 1\}$.

First, we will find critical points on the interior of the unit disk.

$$\{\vec{x} : \nabla f(\vec{x}) = \vec{0} = (4x^3, 12y^2)\} = \{\vec{0}\} = \{(0, 0)\}$$

So, at the origin, $f(0, 0) = 5$.

We will parametrize