Quiz 3
2/27/2023

1. Determine all the critical points of the function $f(x, y) = x^2y - 2x - y$.

2. Use the Second Derivative Test to classify the critical points found above into local minimum, local maximum, saddle point, or inconclusive.

3. Let $f(x, y) = x^2 - xy + y^2$ and let D be the unit disk centered at the origin. You are given the following information:

$$\text{The origin is the only critical point of } f.$$
$$\min_{\text{b.d. } D} f = \frac{1}{2}, \quad \text{attained at } \left(\frac{1}{\sqrt{2}}, \frac{1}{\sqrt{2}}\right).$$
$$\max_{\text{b.d. } D} f = \frac{3}{2}, \quad \text{attained at } \left(-\frac{1}{\sqrt{2}}, \frac{1}{\sqrt{2}}\right).$$

What are $\min\limits_{D} f$ and $\max\limits_{D} f$, and where are they attained?