Recitation 13

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Contents

1 Extrema of Functions of Two Variables

Example 1. Find local extrema for $f(x, y) = (x - y)e^{xy}$.

Solution.

$$f_x(x, y) = e^{xy} + (x - y)e^{xy} \cdot y$$
$$f_y(x, y) = -e^{xy} + (x - y)e^{xy} \cdot x$$

Solving for $f_x = 0$ and $f_y = 0$, the critical points are $\left(\frac{1}{\sqrt{2}}, -\frac{1}{\sqrt{2}}\right), \left(-\frac{1}{\sqrt{2}}, \frac{1}{\sqrt{2}}\right)$.

$$\Delta\left(\frac{1}{\sqrt{2}}, -\frac{1}{\sqrt{2}}\right) < 0$$
$$\Delta\left(-\frac{1}{\sqrt{2}}, \frac{1}{\sqrt{2}}\right) < 0$$

Therefore, both points are not local extrema but saddle points.

Example 2. Find the global maximum and minimum of $f(x, y) = e^{xy}(x-y)$ in the rectangle $|x| \leq 1$, $y \leq 1$.

Solution.

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