

PPE 13 Optimisation with and without constraints.

Exercise 1.

Determine the critical points of the following functions and classify them. That is: determine, if possible, which are maxima, minima or saddle points.

(i). $f(x, y) = x^3 + xy$.

(ii). $f(x, y) = x^3y^3$.

(iii). $f(x, y) = \sqrt{1 - x^2 - y^2}$.

Exercise 2.

Let

$$f(x, y) = -\frac{xy}{x^2 + y^2}$$

(i). Determine the critical points of $f(x, y)$

(ii). Why can't we apply Theorem 13.3.2 here?

(iii). * Do you think that Theorem 13.3.2 can be extended in such a way that it can be applied on $f(x, y)$?

Exercise 3.

(i). Find three positive real numbers, whose sum is 100, such that their product is maximal.

(ii). Find three different positive integer numbers, whose sum is 100, such that their product is maximal.