

DEFINITION.

(1) $f(a, b)$ is the absolute maximum of f on the region R if $f(a, b) \geq f(x, y)$ for all $(x, y) \in R$. $f(a, b)$ is the absolute minimum of f on the region R if $f(a, b) \leq f(x, y)$ for all $(x, y) \in R$.

(2) A region $R \in \mathbb{R}^2$ is bounded if there is a disk that completely contains R .

THEOREM (7.3 – Extreme Value Theorem). *Suppose $f(x, y)$ is continuous on the closed, bounded region $R \in \mathbb{R}^2$. Then f has both an absolute minimum and maximum on R . Further, an absolute extremum may only occur at a critical point in R or at a point on the boundary of R .*

Practical Procedure:

- (1) Find all critical points of f in R .
- (2) Find maximum and minimum values of f on the boundary of R .
- (3) Compare values.